The Blast Furnace and Steel Plant

Editor—FRED J. CROLIUS

EDITORIAL ADVISORY BOARD

THEODORE E. SEE · DR. J. S. UNGER · BARTON R. SHOVER · KENNETH B. LEWIS
F. E. KLING · E. H. McCLELLAND · DONALD N. WATKINS

Volume XIII **JUNE, 1925** **Number 6**

CONTENTS

	Page
THIS SPELLS PROSPERITY IN STEEL	229
OPEN HEARTH PRESSURE CONTROL—By G. R. McDermott	230
CHROME SURFACES ELECTROLYTICALLY DEPOSITED—By Colin G. Fink	234
STUDY OF CARBON USED IN BLAST FURNACE OTHERWISE THAN BEFORE THE TUYERES —By W. D. Brown	236
THE SAFETY CRUSADE: CAUSES OF ACCIDENTS IN MATERIAL HANDLING—By David S. Beyer	239
COMBUSTION OF COKE AT THE TUYERE LEVEL OF THE BLAST FURNACE—By S. P. Kinney	243
BOOK REVIEW: METALLURGY OF ALUMINUM AND ALUMINUM ALLOYS—By M. M. Von Bernewitz	248
THE DAWN OF A NEW ERA—By D. J. Kelley	249
EASTERN STATES BLAST FURNACE AND COKE OVEN ASSO	250
AMERICAN IRON AND STEEL INSTITUTE	251
CURRENT REVIEW:	
FLEXIBILITY NECESSARY IN AMERICAN CAN PLANT	252
IMPROMPTU REMARKS OF E. H. GARY	253
NATIONAL PRESSED METAL SOCIETY FORMED	255
CURRENT LITERATURE ON FERROUS METALLURGY—By E. H. McClelland	256
THE SHEET STEEL INDUSTRY—By W. S. Horner	257
WORLD'S GREATEST LOCOMOTIVE	260
THE POWER PLANT: EXPANSION STEAM BENDS, PART II—By P. M. Gallo	261
WITH THE EQUIPMENT MANUFACTURER	263
TRADE NOTES AND PUBLICATIONS	266
THE OPEN-HEARTH	267
SOME POINTERS ON BY-PRODUCT COKE OVEN OPERATIONS	268
NEWS OF THE PLANTS	269

Published the first of each month by The Andresen Company Inc.

Main Office—Thaw Building, 108 Smithfield Street, Pittsburgh, Pa.

President: L. L. CARSON · Vice President: GEO. A. ERB · Secretary and Treasurer: M. M. ZEDER

Branch Managers

JONES & SALE, Western Representatives
1014 Garrick Theatre Bldg.
Phone—State 4357
Chicago, Ill.

ROBERT E. POWELL, Eastern Manager
29 West Thirty-fourth Street
Phone—Wisconsin 5495
New York, N. Y.

Subscription Price:—In the United States, $2 per year; Canada, $2.50; all other countries, $3.50. Single Copy, 25 cents.
Entered as second-class mail matter at Pittsburgh, Pa., under the Act of Congress, March 3, 1879.

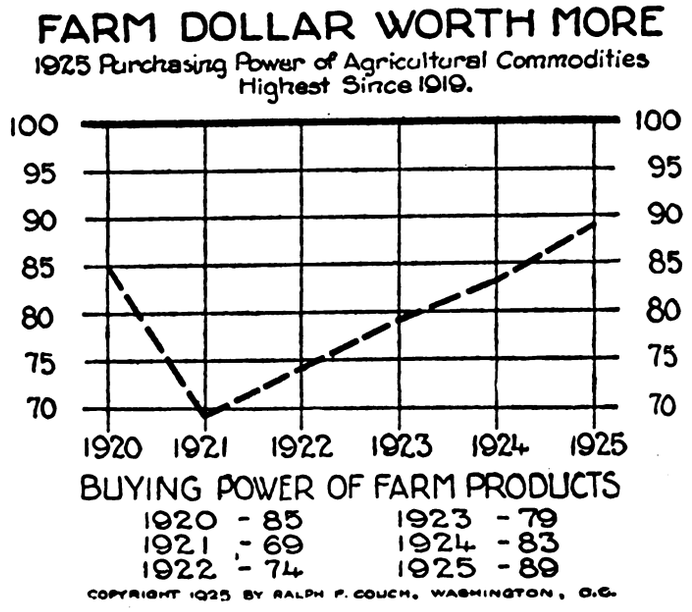
Generated on 2024-09-07 22:18 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The Blast Furnace and Steel Plant

Vol. XIII PITTSBURGH, PA., JUNE, 1925 No. 6

This Spells Prosperity in Steel

THE purchasing power of agricultural commodities in exchange for other commodities now is higher than it has been for any year since 1919, according to a price study made by the Department of Agriculture. The Agriculture Department made its study in this way. It averaged prices of both agricultural commodities and non-agricultural commodities for the years 1909-1914. The next step was to study the rise in both classes of commodities above the 1909-1914 average. Since the year 1919 it is shown that the general level of agricultural prices has been lower than the general level of non-agricultural prices.



Thus in 1914 a farmer might receive $1 for a bushel of wheat and that dollar would purchase him a hat. In some subsequent year he might receive $1.25 for a bushel of wheat, but for the hat he would have to pay $1.35. In that instance the purchasing power of wheat in exchange for hats would be expressed by the index figure 93.

The Agriculture Department has made this reckoning to include all agricultural commodities on one hand and hundreds of representative non-agricultural commodities on the other. It is found that during 1920 the index of farm purchasing power was 85. It fell to 69 in 1921, a low point. So far in 1925 it has averaged 89.—Railroad Data.

Generated on 2024-09-07 22:14 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Open-Hearth Pressure Control

Performance of an Open Hearth Furnace Before and After Installation of Turbo-Blower and Constant Volume Air Governor on the Gas Producer Which Supplies Gas to the Open Hearth Furnace

By G. R. McDERMOTT*

WHEN it is realized that the capacity of a gas producer depends primarily upon the amount of air introduced by the air blower, the importance of this part of the producer has never been given much consideration. An efficient blower is always essential to obtain the best results. By an efficient blower is meant one which will deliver a large amount of air with a small amount of steam, sufficient for the prevention of clinkers, at the same time delivering the required amount of air uniformly independent of the back pressure on the blower.

During the years 1920-21 the beginnings were laid for the present development in controlled combustion within the open-hearth furnace. The investigations took many forms, largely depending upon the equipment available to the particular engineer or combustion committee. National success with combustion control of very large boiler furnaces where automatic furnace pressure control equipment had revolutionized steam practise, suggested the adaptation of this equipment for metallurgical use.

Mr. McDermott put the ideas into practise, as the accompanying charts, which were taken off during those years, indicates.

The chemical reactions taking place in a producer are simple. At the junction of the ash and coke beds, the coal actually burns by combining with the air delivered by the blower and in burning gives off a large amount of heat with the formation of carbon-dioxide, CO_2. The heat is utilized to heat the coal above, forming a bed of incandescent coke or carbon. Carbon-dioxide, CO_2, in passing up through the bed of hot coke is reduced to carbon-monoxide, CO. If a producer could be run by air alone, it would be ideal, but the heat generated by the combustion would melt the ashes produced, causing the formation of clinkers. Ash from a good gas coal should not fuse below 2,200 to 2,500 deg. F., hence the temperature of the combustion zone should not quite reach this point.

To prevent clinkering, this excess heat must be removed and the temperature of the combustion zone must be kept below that of the melting point of the ash. This is accomplished by the addition of the steam to the air, which in the case of the jet type of blower the steam is used directly for drawing in the air.

By taking the temperature of the mixture of steam and air in the blast, it can roughly be determined the correct amount of steam necessary, as very few coals will clinker with a blast temperature of 140 deg. F. Beginning at this point, it may be gradually lowered until clinkering is obtained.

The back pressure on a blower of a producer is that due to resistance of gas mains, furnace flues and regenerators in the case of an open hearth furnace, plus the resistance of the fuel bed and hood of the producer. This back pressure varies from hour to hour depending on clogged flues, too thick or sticky a bed of green coal, ashes too tightly packed, a clogged tuyere hood and other conditions. A variation in back pressure and variation of steam pressure at the jet blower necessarily means a variation in air delivery to the producer and consequently varying gasification rates.

The steam jet blower is limited to about 4 inches of water back pressure as a maximum. As the back pressure is increased, the amount of air admitted is lessened and therefore the ratio of air to steam is reduced and this raises the temperature of the blast and reduces the temperature of the incandescent zone to a point below 2100 deg. F., which permits the passage of undecomposed steam and CO_2. A large excess of steam will, therefore, always give a poor gas, high in hydrogen and CO_2, making a lean gas of which a large amount is necessary, which in turn calls for higher driving rates and proportionate losses of efficiency.

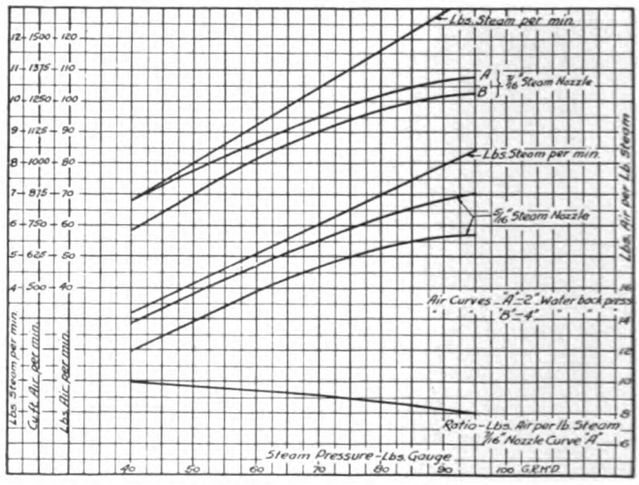


FIG. 1.—*Shows the performance of No. 2 Furnace at No. 1 Open Hearth Department before and after the installation of turbo-blowers and constant volume air governors on the gas producers which serve this furnace.*

Knowing the inefficiency of the ordinary steam jet type of air blower induced the writer to a development of a more efficient method of supplying the necessary air to the gas producer. As a means he selected a steam turbine blower equipped with a con-

*Assistant Engineer, Illinois Steel Company, South Chicago, Ill.

Generated on 2024-09-07 22:17 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

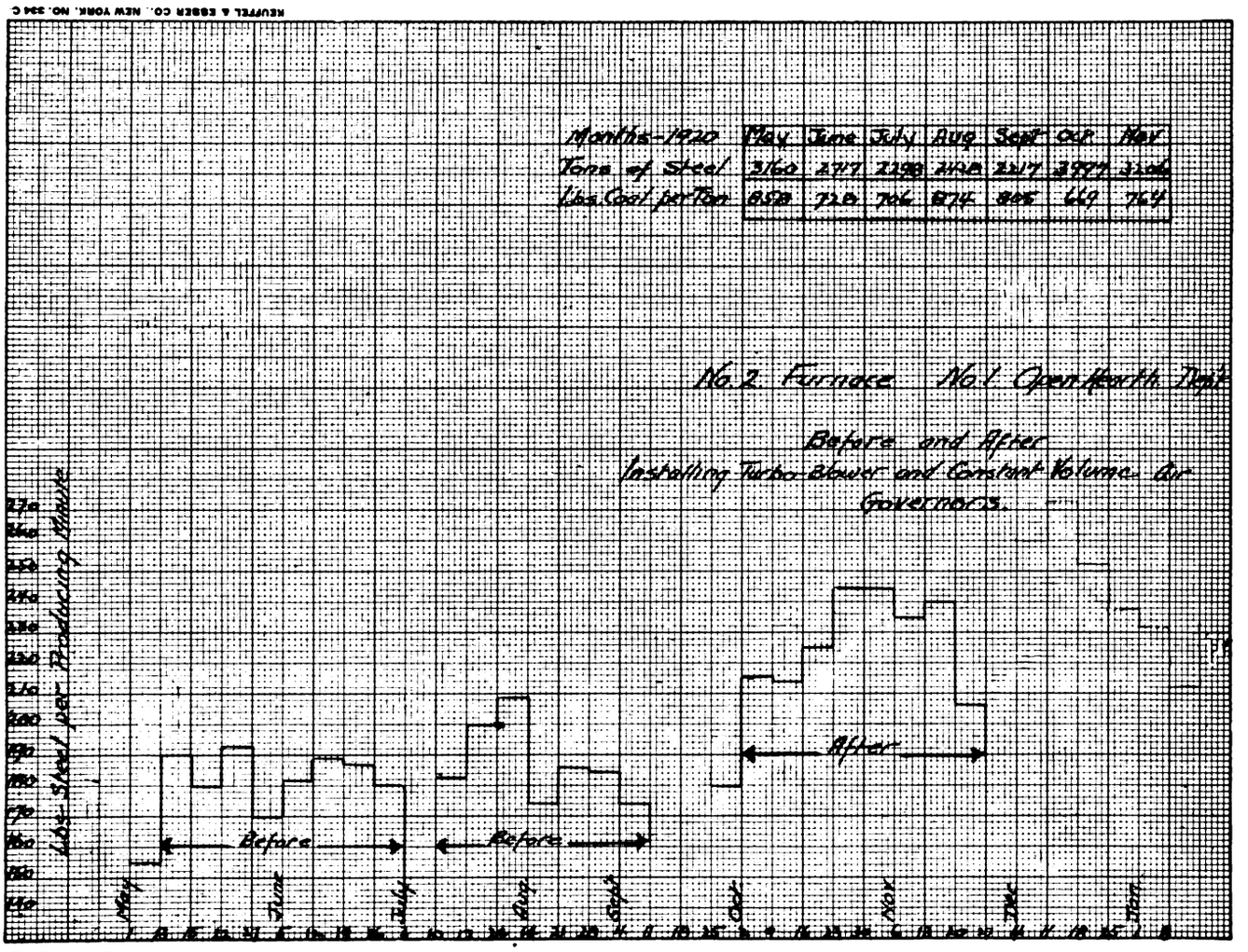


FIG. 2.—Gives the log of "Pounds of Steel per Producing Minute" as an average per week during the time that gas was actually on the furnace. The operation shown was between cleaning or relining periods. It is to be noted that the turbo-blowers and governors were installed on the furnace during the week of September the 18th, when the furnace was down for repairs. No changes were made in the furnace lines or ports while the furnace was down and it is reasonable to conclude that the increased steel production and reduction of coal consumed was largely due to the installation of the above mentioned apparatus. The difference in operation represents an increase in the steel production of the furnace of approximately 20 per cent. Regarding the coal consumption per ton of steel, it is to be noted that in the case of the month of October where no coal was used for heating up the furnace after having been down for repairs that the coal consumption was 669 lbs. Taking like periods during previous runs such as June and August, the coal consumption was 728 and 874 lbs. respectively.

stant volume governor of his own design. The steam turbine blower consumes less steam per unit volume of air delivered and, although the ratio of weight of air to weight of steam delivered varies with the back pressures on this type of blower, the ratio is only slightly affected by an increase of back pressure on the blower.

Furthermore, by means of the constant volume governor mentioned above, the air delivered may be predetermined and is independent of the back pressure on the blower and steam pressure to the turbine, which removes the objectionable features of the steam jet type.

In order to test out the practibility and claims of the turbo-blower and constant volume governor, three 10-ft. Morgan hand poked producers were equipped at No. 1 Open Hearth of the Illinois Steel Company, South Chicago.

These three producers have been operating continuously since September 20, 1920, to date without developing any trouble whatever. All indications point to a removal of the inefficiencies and objections of the steam jet blower, resulting in a saving of approximately 30 per cent in the steam required for blowing the producers and an increase in the steel produced by the furnace and a corresponding reduction in pounds of coal per ton of steel for like periods in the furnace campaign.

The Figs. 3 and 5 show the installation of the three producers equipped with turbo-blowers and constant volume governor.

By referring to a drawing (not shown) of the producer and turbo-blower, it will be seen that the exhaust "E" from the steam turbine is introduced into the air blast main. Temperature reading taken of the blast temperature showed 124 deg. F. which was sufficient to prevent clinker troubles when the producers were burning Illinois coal of the following approximate analysis:

CONTENT	PER CENT
Volatile	34.86
Fixed Carbon	45.44
Ash	9.22
Sulphur	1.31
Moisture	10.48
Btu.	11,141

Generated on 2024-09-07 22:22 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The pounds of steam per pound of coal amounted to approximately .25.

Gas analysis taken over a period of several days from the common gas main from the three producers showed an average of:

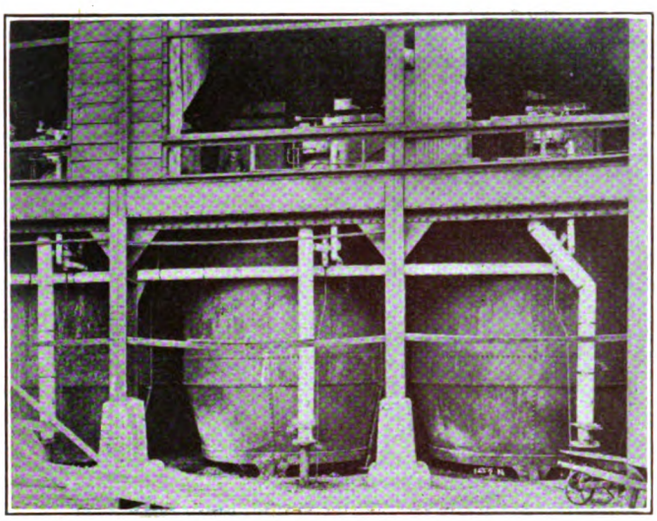


FIG. 3.—*A view of the gas-producers which were tested under controlled operation.*

CONTENT	PER CENT
CO_2	8.00
CO	22.00
C_2H_4	.65
H	10.45
CH_4	2.75
Btu.	132

In order to secure flexibility of operation an upper weight was provided, which was movable along the lever, "L_1" which was graduated in cubic feet per minute. By such an arrangement, the constant volume governor will control the speed of the turbine such as to maintain the delivery of any predetermined quantity of air per minute independent of the back pressure on the air blower or fan. This weight may be shifted to meet the open hearth furnace gas requirements throughout the period of the heat.

As a result of a series of experiments conducted on a steam jet blower of the familiar type, Fig. 1 shows the amount of air delivered and corresponding steam consumption of the blower, when using steam nozzles of 5/16 in. and 7/16 in. diameter. It will also be noted the reduction of air delivered with the increase of back pressure from 2 in. to 4 in. of water. See curves "A" and "B".

For example, assume that a producer is gasifying coal at the rate of 1,200 lbs. per hour, requiring 50 cu. ft. of air per pound of coal (Illinois). The back pressure on the blower is assumed at 3 in. of water. By referring to the curve sheet, it will be noted that the steam pressure required on the blower is 52.5 lbs., this corresponds to a steam consumption of the blower when using a 7/16-in. nozzle of 8.3 lbs. per minute or 498 lbs. per hour, resulting in a ratio of pounds of steam per pound of coal of .42. Suppose that the back pressure on the blower had been increased to 4 in. of water due to conditions mentioned heretofore. It will be noted that for the same air delivery, that the steam pressure would have to be increased to 58 lbs. resulting in a steam consumption of 545 lbs. steam per hour, or a ratio of pounds of steam per pound of coal of .46.

It should also be noted that with the increase of back pressure on the blower that the air delivered was reduced from 1,000 to 913 cu. ft. per minute or 8.7 per cent. This, of course, results in a reduction of gas produced. Quite often an open hearth furnace is unbalanced, that is there is a marked difference in the resistance of gas flow of one side of the furnace as compared with the other. This condition manifests itself in a difference of back pressure on the producer;

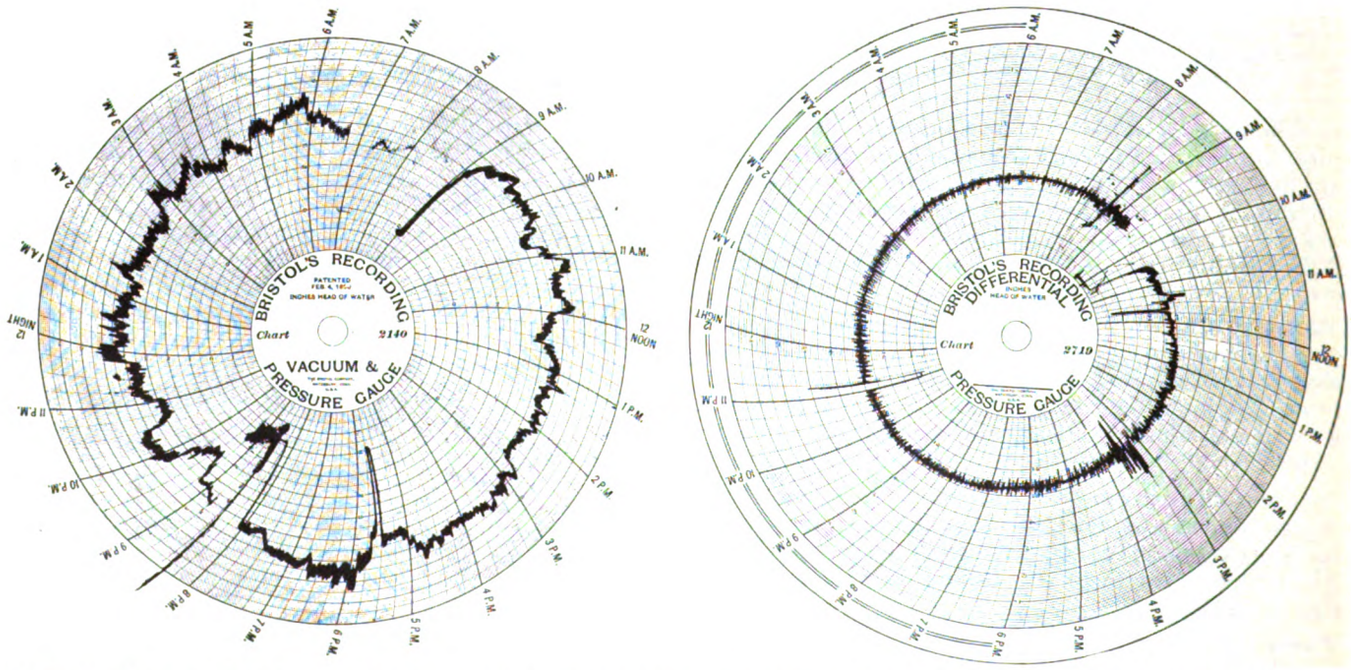


FIG. 4.—*Chart on the left shows the average fluctuation of volume air where a producer is turbo blown uncontrolled by any automatic device; variation of back pressure on blower causes extreme variation of air delivery by blower. Chart on the right emphasizes the results obtained in practise when a constant volume governor is in operation.*

Generated on 2024-09-07 22:16 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

by means of the constant volume air governor on the turbo-blower this unbalanced gas flow is corrected automatically.

As a result of the operation of the turbo-blowers and automatic constant volume governors on the gas producers when using Illinois coal, we find that the temperature of the air blast is about 125 deg. F. or saturation temperature. This corresponds to about

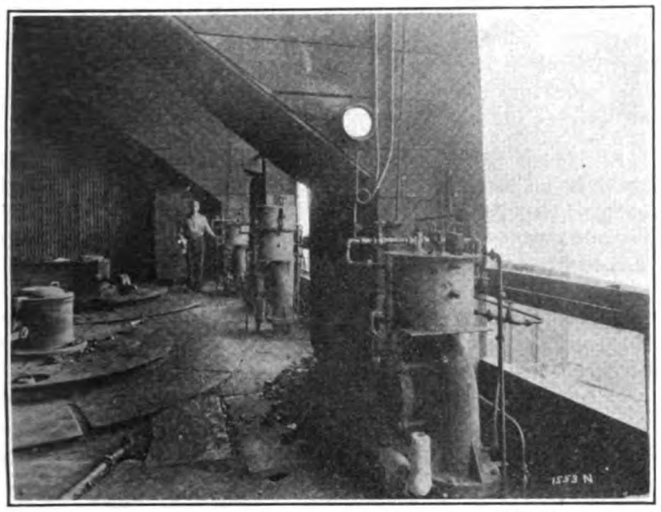


FIG. 5.—*View across the charging platform showing automatic controls.*

.3 lb. of moisture per pound of coal gasified. When the ratio of pounds of moisture per pound of coal is increased to .42 and .46 as given above, the blast temperature will increase from 135 deg. F. to 138 deg. F. We have found that with the blast temperature of 125 deg. F. there is no indication of troublesome clinkers, indicating that blast temperatures above 125 deg. F. with coal of the given analysis means that excessive steam is being used with resultant reduction in the producer efficiency.

Safety Steel Flooring and Stair Steps for Industrial Purposes

Insurance statistics show that falls are the chief source of accidental casualties, about half of them occurring on floors, walkways and stairs. It is but natural, then, that business executives and plant managers should give attention more and more to means of reducing this underfoot hazard, with its attendant losses and liability.

The most logical safeguard aganist accidents from this cause is the adoption of non-slipping floors and stair steps — in the manufacture of which the Irving Iron Works Company of Long Island City, N. Y., is the pioneer, with Irving "Subway" non-slipping open steel flooring and Irving "Safestep" non-slipping steel stair or ladder steps.

In these specialties, the non-slipping feature is not secured by the use of any abrasive material, lead insets, or other extraneous means. The non-slipping quality is permanently inherent in the flooring and step itself, and is the result of the alternate arrangement of straight and "reticuline" steel bars solidly riveted together with all edges flush on one side, in panels of suitable size. This gives a walkway surface which, while smooth to stand or work or walk upon and easy to roll barrels or trucks upon, has a peculiar foot-gripping quality that is not impaired by wear, or by water, snow, oil, grease or soap upon it, and that lasts as long as the floor panel or step.

The "reticuline" (or curved) bars are of less depth than straight bars, against which they are riveted with top edges flush and which bear upon the supporting frames at the end of the panel. The function of these "reticuline" bars is three-fold. They bear their share of the load and communicate it to the straight bars adjoining. They also prevent the buckling or twisting of the straight bars by bracing them at the top chord. And they act as truss members in distributing a concentrated load over a number of panel members. Thus the full fibre strength of each bar is utilized, and the maximum load capacity secured with the minimum of weight.

There is another distinct advantage in having the "reticuline" bars of less depth than the straight bars. Tests have revealed that this construction passes more light through, and gives better lighting distribution beneath, than where all bars are of the same depth. This is an important feature where non-impairment of illumination is a consideration.

Of the total area of a "Subway" flooring panel, 80 per cent is open space for lighting and ventilation. This feature is of special value in power plants, central stations, steel works and other industries where temperatures may be high, and in chemical industrial plants where fumes and gases may prevail.

This flooring is made up in complete panels of convenient size, the dimensions and weight being determined by the span and the load to be carried. The laying of such a floor consists simply in the proper lay-out of supporting framework carrying a requisite number of unit panels of suitable size selected from the standard catalog list. No drilling or tapping, no bolts or screws, are needed to secure it in place, as simple fastening devices go with each panel. Because of the light weight the dead load is less and the supporting framework need not be so heavy.

"Safesteps" are made in 24 standard sizes, each a complete and self-contained unit with carriers attached, ready for mounting. No separate nosing bar or enclosing frame is needed. "Subway" flooring with "Safesteps" makes a highly economical fire-escape conforming with most regulations. These safety floors and steps are increasingly in demand in connection with galleries, walkways and mezzanine floors in power plants, boiler rooms, factories and industrial plants of all kinds. Experience indicates that both are peculiarly rust-resisting, even in the most exposed situations.

Southern Exposition Parallels I. & S. Institute Meeting

An interesting special feature greeted the visiting steel executives during their stay in New York. At the Grand Central Palace large exhibits of southern iron, steel and allied manufacturers were assembled. Such concerns as Tennessee Coal, Iron & Railroad Company, Alabama Pipe Company, Gulf States Steel Company, Federal Products Co., Alabama Power Company told their story of permanent growth in the industrial south. To the northerner, not personally familiar with the marvelous progress being made elsewhere, this exhibition was a revelation.

Generated on 2024-09-07 22:14 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Chrome Surfaces Electrolytically Deposited

Results of Long Research Makes Practical Unlimited Applications of Chromium to Metals

By COLIN G. FINK,* Ph.D.

FOLLOWING the development of the electrolytic method by which rare ancient bronzes, corroded beyond recognition, are now being restored to their original form, the research engineers of the Chemical Treatment Company have perfected commercially a process for chromium plating.

The commercial development of chromium plating offers an opportunity for industry as a whole to utilize the invaluable properties of metallic chromium in a thousand different ways that heretofore have not been possible.

The use of small percentages of chromium to produce stainless or rustless steel alloys and extremely hard chrome steels is well known. The advantages of using chromium as a metal sheath or coating on other metals as a protection against heat and corrosion, and to greatly increase surface wearing qualities, have long been apparent.

In appearance, a chromium plated surface may be dull gray or have a silver luster, or have a polish much more brilliant than nickel with practically the same reflecting power as a high-grade mirror. As the surface will not tarnish or corrode, no polishing is ever required and it will outlast indefinitely all similar surfaces.

The first factory for the production of chromium plate has been in operation for several months and thousands of steel, iron, brass and copper articles have been produced for commercial use.

Crodon, the trade name under which chromium plate is being produced, has been developed by Dr. Fink for the Chemical Treatment Company, Inc., 26 Broadway, New York City, and is but one of the products in the chemical and metallurgical field which that company has perfected or is developing.

Crodon will, in thousands of cases, afford the manufacturer an opportunity to discard the high-priced alloys which are so difficult to machine and permit him to fabricate his product of more easily worked metals, and still secure the necessary non-corrosive, hard and attractive surface qualities by applying a Crodon surface coating.

High temperature thermometer casings, golf club heads, plumbing fixtures, table ware, steam soot cleaner parts, marine hardware, high pressure steam valve seats, surgical instruments, turbine blades, acid-proof containers, automobile parts and accessories, headlight reflectors, micrometers, dies and crusher-balls, are articles to which Crodon can be applied to economic advantage, and the variety of objects mentioned is but an indication of the extent of the field for chromium plate.

For manufacturers of machinery of all kinds, the electrical field, railroads, farm implements and the metal trades in general, there are innumerable applications for chromium plate. The hardness, wear resistance, corrosion resistance and permanent non-tarnishing attractive appearance of Crodon will give the solution to many of the problems of the metal industries.

A steel steam valve seat plated with chromium and tested under 190 lbs. of superheated steam, first passed through aluminum sulphate crystals to give the maximum corrosive effect, has withstood a test of 200 hours, part of the test being run with the valve practically closed to obtain the maximum wire-drawing effect wthout affecting the valve seat. This means that valves and seats can both be made of a steel having the same coefficient of expansion so that there will be no buckling in the valve seat as is sometimes the case when the seats are made of alloys.

Crodon is being used commercially for that portion of steam soot cleaner elements exposed to boiler gases and the direct impingement of the flames and is giving very satisfactory results in that there is no surface corrosion. A small test piece of steel pipe plated with less than one-half mill of chromium withstood a temperature of 2000 deg. F. for 24 hours without affecting the plated surface in any way, although the inside of this pipe, also subjected to the flame gases, was corroded to such an extent that half its thickness was eaten away. There is a real field for Crodon in lengthening the life of turbine blades and many other engine and pump parts and accessories which are now subject to excessive wear and corrosion.

Chromium is highly resistant to all organic acids and to nitric and sulphuric acids. Crodon ware will resist corrosion indefinitely and can be heated to high temperature without the scaling and pitting so familiar with ordinary iron and copper ware. Machine parts of chemical apparatus, made of ordinary metals, can be protected by Crodon plate and made to resist the corrosive action of a large variety of chemical reagents, besides outlasting all other metals in wearing qualities.

Crodon plated copper strips have been repeatedly bent and twisted until the copper itself breaks, without any peeling or flaking of the plate.

In the hardware field, stainless steel is well known and when it is considered that this steel contains only 13 per cent of chromium, the corrosion-resistant properties of a chromium plate will be immediately apparent. The hardware trade, above all others, appreciates the deterioration of stock due to rust and other corrosion and it is only necessary to look over any hardware catalog and find innumerable articles on which Crodon can be used to advantage.

Where appearance is not a factor, Crodon plate is most readily produced with a soft gray finish which is attractive although entirely without brilliance.

Chromium plated files have retained their sharp cutting teeth indefintely while in stock in localities

*Division of Electro-Chemistry, Columbia University, New York City.

Generated on 2024-09-07 22:26 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

where ordinary files soon lost their value and had to be returned to the manufacturer.

Chromium plated bearings of shafts and similar machine parts have resulted in a great saving in replacements.

For hospitals, hotels, public buildings and in the home, chromium plate can be applied in innumerable ways. Plumbing and other fixtures plated with chromium are much more brilliant than when nickel plated. The yellow tint which is a characteristic of nickel plate is not present in Crodon and, particularly under artificial light, Crodon has an exceptional brilliance. A well recognized testing laboratory reports that chromium plate is at least seven times harder than nickel plate. When it is considered that nickel plate requires polishing with abrasive metal polish to preserve its brilliance and that the Crodon finish is so tarnish-proof that no polishing is required, it can readily be seen that an estimate of at least 20 times the life of nickel plate is not excessive. As Crodon fixtures are also plated on the concealed portions, the green stain of a corroded metal will not appear. Plated building hardware, such as doorknobs, door plates, hinges, etc., can now be furnished in a permanent brilliant or frosted silver-like finish particularly desirable in locations where the light is poor.

Although a brilliant, lustrous or mat finish, having a silvery appearance, is now little used in building hardware except for bathroom fittings, it is expected that chromium plate will have a wide use in this field because there can be no damage to woodwork or paint from injurious polishing compounds which are no longer needed.

Chromum plate in the above fields will result in a very large maintenance saving as no time is required for polishing, except for wiping off such dust as may collect. In public places, where wear is excessive, the long life of chromium plate will greatly reduce the cost of replacement. The various silver-like finishes which can be secured with Crodon give it a very attractive appearance against a mahogany, cream or white background.

The rapid discoloration of silver when brought into contact with food such as eggs, onions, lemon juice, etc., often resulting in deep black stains so difficult to remove, is entirely foreign to Crodon plate.

The field for chromium plate is so vast and the development of Crodon is so new that there has not been sufficient time to carry on a series of exhaustive service tests in the marine field; but although this has not been done, the following interesting though accidental test will indicate the value of a chromium surface.

A tablespoon, plated with Crodon, was placed in a glass about one-quarter full of milk at the time one of the engineers closed his ocean front summer home last fall. This spoon remained in the glass for seven months and when the house was reopened for the present season, it was found that although the gas-stove in the same room was very badly rusted, that the aluminum and bronze paint on the fire irons had not protected the iron from rust and that the salt air had corroded copper and brass articles, the chromium plated spoon had not lost any of its brilliance and that portion exposed to the corrosive effect of the lactic acid in the milk was entirely unaffected. The metal house numbers plated with Crodon and tacked on the front steps about 100 feet from the ocean, were unaffected by the salt atmosphere over the same period of time.

Chromium plated containers have held concentrated nitric acid for long periods without even affecting the polish. Brightwork, the sailors' curse, now has an opportunity to appear with a chromium surface which will have a lasting brilliance, will not require polishing, and will wear at least 20 times as long as nickel plate.

There is a real field for Crodon in lengthening the life of turbine blades and many other engine parts and ships' hardware which are now subject to excessive wear and corrosion.

The Chemical Treatment Company, to which the patents pendings have been assigned, plans to continue the production of Crodon by enlarging its present plant capacity and erecting additional plants at central locations. At a later date the company may be willing to license the process to manufacturers who will need chrome plating in quantities. Dr. Fink and his associates have very carefully studied the numerous variables which have heretofore made commercial chrome plating impossible. These variables have now been brought under perfect control and industry can prepare to reap the full benefits of the invaluable characteristics of this remarkable metal, chromium—so exceptionally resistant to wear, corrosion and high temperature.

Method for Casting Soft Center Ingots

At the head of a marble stairway in his mansion on Riverside Drive, New York, there stands the life-size bronze figure of a puddler. Charles Schwab, a king of steel, has designed this idea so that he will be reminded of his puddling days and what he has done for the steel industry.

Other men have spent years at puddling. John Glynn has spent over a quarter of a century in the steel works and mills. From vast practical experience, he has developed a new and practical invention. Applying his practical knowledge, he has produced a new method for casting soft center ingots; any other steel requiring different carbons in the same ingot can be made. This method is almost revolutionary in that the total finishing operation, which now involves casting, heating, rolling and pickling, is reduced to the single function of casting.

A considerable saving of these costs is effected, lessening the cost of production, and the first shapes used in ordinary practice have not the heating, rolling and pickling added as alluded to above. Mr. Glynn further claims that there is less danger of coarse crystallization than by the old practice.

A patent has been granted to an experienced iron and steel worker who has spent 30 years as a puddler and open hearth melter in the mills. Canadian rights have also been granted for this method of producing steel for agricultural implements.

While there are many steps between a patented idea and the actual production of the soft center ingot on a sound commercial base, the economies of production which suggest themselves to the practical steel man should warrant at least the costs of the experiment.

Generated on 2024-09-07 22:18 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

A Study of Carbon Used in Blast Furnace Otherwise Than Before the Tuyeres

By W. D. BROWN*

VARIOUS writers have endeavored to find what percentage of the carbon charged as coke is burnt before the tuyeres. In the present article, an attempt is made to study the weight of carbon used otherwise than at the tuyeres.

Reactions in the Furnace.

An almost endless number of reactions have been written as occurring in a blast furnace. It has been supposed that a particle of iron ore was reduced by carbon monoxide and the next instant it would be oxidized by carbon dioxide. Such is not the case. Carbon monoxide gas formed at the tuyeres by combustion or in the hearth by reduction of silica, etc., rises through the ore, reducing it in the top of the furnace. A certain amount is required for the reduction, the rest goes out the top of the furnace. If the carbon dioxide resulting from the reduction becomes a certain percentage, it will stop the reduction by carbon monoxide but, it is believed, this limit is not reached in a normally working furnace.

Williams, Barrett and Larsen† in their work on production of sponge iron, show that direct reduction with carbon does not occur to a great extent in vacuum but reduction is through the medium of carbon monoxide; the carbon dioxide formed may or may not combine with carbon in accordance with its percentage in the gas and the temperature. Fig. 1, taken from their paper, gives the equilibrium of CO_2, CO and C as well as the iron oxide equilibrium.

The same authors show that iron ore in presence of carbon, is reduced to the metal (at least 98 to 99 per cent) at a temperature below 1800 deg. F. This is substantiated by work done by the writer. From this, it seems certain that but little unreduced ore reaches the hearth of a normally working furnace.

As the gas current rises, it is joined by the carbon dioxide from the limestone. This begins to come off at about 1520 deg. F.; probably the temperature is much higher before the last is off. At this temperature, the carbon dioxide reacts with carbon in the so-called "solution reaction":

$$CO_2 + C = 2\ CO$$

This reaction is reversible and depends upon the temperature and the per cent of CO_2 in the gas. From a study of the diagram of Fig. 1, it is probable that the carbon dioxide from limestone causes a solution loss nearly equal to the weight of carbon in the stone.

It has been shown‡ that the hydrogen in the top gas is more than could have come from the moisture in the blast and the hydrogen in the coke. It is assumed that the excess is derived from the decomposition by carbon of the combined water of the ore in the top of the furnace, the result being H_2 and a mixture of CO_2 and CO.

The carbon used otherwise than at the tuyeres may be divided as follows:

(A) Reduction of silicon, manganese, phosphorus and sulphur. The metalloids are only reduced by solid carbon and the carbon required is about 50 lbs. per ton of pig iron.

(B) Reduction of the last trace of iron oxide. Iron oxide should be largely reduced by carbon monoxide. Certainly, the indications are that at least 98 per cent of the ore is reduced below 1800 deg. F.

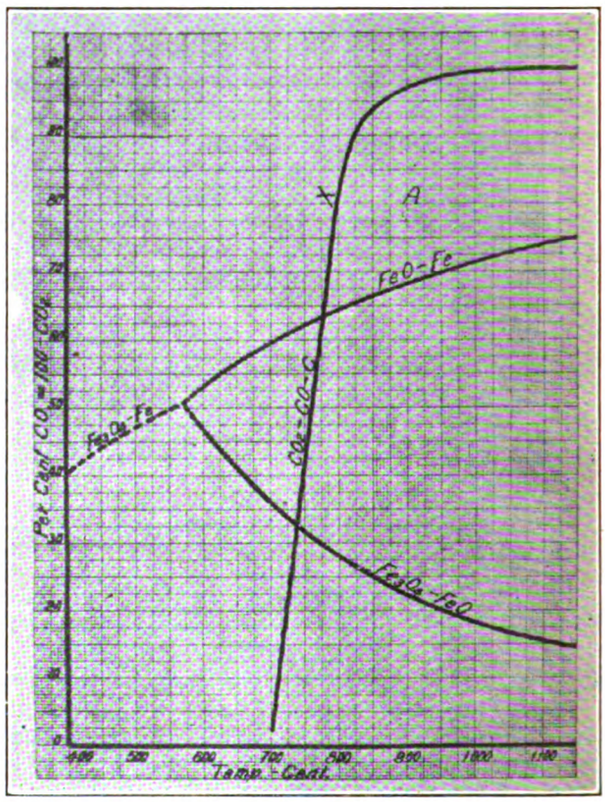


FIG. 1.—*Curves showing the equilibrium of CO_2, CO, and C, as well as that of iron oxide.*

(C) Impregnation of pig iron. Solid carbon is absorbed by pig iron to the extent of about .04 lbs. per lb. of pig or 90 lbs. per ton of pig iron.

(D) "Solution Loss." As has been said, the carbon dioxide from the stone causes solution loss of carbon, probably, to the extent of the carbon in the stone. Solution loss may also be caused by the carbon dioxide resulting from reduction of iron oxide as stated above.

(E) Decomposition of water. As stated previously, the carbon of the coke may decompose water in the top of the furnace. In one test, .03 lb. per lb. iron or 67 lbs. per ton of iron were so used.

*Chief Chemist, Duquesne Works, Carnegie Steel Co.

†Bureau of Mines, Serial No. 2656.

‡Wysor and Brown, Chem. & Met., July, 1910.

Generated on 2024-09-07 22:22 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Table

Column	1	2	3	4	5	6	7	8	9	10	11	12	13
			Carbon. Pounds per ton of pig iron.										
		Coke Charged	Charged In Coke	Burnt At tuyeres	Used otherwise than Coke	Hearth Reduction & Impregnation	Sol. Loss & Reduction of H_2O	In Stone	Sol. Loss (above stone) & Reduction of H_2O	As CO_2 In Gas	As CO_2 Theory	Excess	Sol. Loss
Fce #					(3)-(4)		(5)-(6)		(7)-(8)			(11)-(10)	(10)-(11)
1		2486	2077	1699	378	140	238	127	111	729	672	57	
2	H #1	2615	2257	1894	363	140	223	141	82	609	672		63
3	5	2198	1910	1637	273	140	133	120	13	610	672		62
4	15	1716	1494	1217	277	140	137	109	28	614	672		58
5	17	1702	1489	1150	339	140	199	88	111	529	672		143
6	19	1673	1482	1202	280	140	140	94	46	576	672		96
7	26	1584	1413	1106	307	140	167	99	68	552	672		120
8	B of M 1	1907	1644	1321	323	140	183	88	95	547	672		125
9	2	1892	1631	1355	276	140	136	99	37	541	672		131
10	3	1958	1663	1374	289	140	149	86	63	508	672		164
11	4	2070	1765	1529	236	140	96	144	48	616	672		56
12	5	2040	1743	1409	334	140	194	105	89	586	672		106
13	6	1704	1502	1152	350	140	210	80	130	497	672		185
14	7	2000	1778	1569	209	140	69	99	30	615	672		57
15	8	2085	1780	1463	317	140	177	136	42	665	672		7
16	9	1720	1518	1181	337	140	197	87	110	573	672		99
17	10	1950	1720	1343	377	140	237	81	156	550	672		120
18	11	1745	1628	1294	334	140	194	76	118	495	672		177
19	12	2450	2090	1811	279	140	139	139	00	696	672	24	
20	13	2158	1832	1460	372	140	232	92	140	571	672		101
21	14	2213	1879	1489	390	140	250	83	167	593	672		80

Column #1. Fce #1 - Chemical and Metallurgical Engineering, July, 1910.
Fce #'s 2 and 7, Howland, Trans American Institute of Mining Engineering, LVI, 339.
Fce #'s 8 and 23, Royster, Joseph and Kinney, B.F. & S.P., April, 1924.
Column #4. Carbon burnt at tuyeres - ,54 N_2 + (CO_2 + CO + CH_4) x carbon gasified.
6. Carbon required for reduction of Si, P, Mn, S and for impregnation.
7. Sum of carbon lost by solution, and reduction of H_2O in the top of furnace.
9. Solution loss in excess of that caused by carbon of stone, and carbon for reduction of H_2O.
11. Carbon required as CO_2 if all reduction by CO and no solution loss except due to stone.
13. Deficiency of C as CO_2, showing solution loss in excess of that caused by stone.

Method of Calculation of Carbon Burnt Before the Tuyeres.

Dry air is 20.9 per cent oxygen and 79.1 per cent nitrogen, the volume of nitrogen being 3.78 times the volume of oxygen. For purposes of calculation, air may be considered (O_2 + 3.78 N_2) and the reaction of combustion of carbon at the tuyeres may be written:

$$O_2 + 3.78\ N_2 + 2C = 2\ CO + 3.78\ N_2$$

But the blast contains moisture; if (m) be the volume of moisture per cu. ft. of air, the moisture per cu. ft. of oxygen is 4.78 m and the reaction of combustion may be written:

$$O_2 + 3.78\ N_2 + 4.78\ m\ H_2O + (2 + 4.78\ m)C = (2 + 4.78\ m)CO + 3.78\ N_2 + 4.78\ m\ H_2$$

The carbon monoxide as compared with the nitrogen is $\frac{2 + 4.78\ m}{3.78} \times N_2$. But the moisture is usually stated as grains moisture per cu. ft. wet air as found from psychrometric tables and g (grains moisture per cu. ft. air), should be substituted in the formula for m. The weight of a cu. ft. of water vapor is 332.4 grains from which m = .003 g.

By substitution: $CO = \frac{2 + .0144\ g}{3.78} N_2$ or

$$(.5291 + .0038\ g)\ N_2.$$

The carbon monoxide formed at the tuyeres is (.5291 + .0038 g) times the nitrogen at the tuyeres and since the nitrogen at the tuyeres is practically the same as the nitrogen at the top of the furnace. the CO formed at the tuyeres stated as percentage of the top gas is (.5291 + .0038 g) N_2. N_2 is percent nitrogen in top gas.) The total carbon in the top gas is represented by (CO_2 + CO + CH_4), the symbols representing percentage in the top gas.

The ratio of carbon monoxide formed at the tuyeres to total carbon gas in the top gas is, therefore, $\frac{(.5291 + .0038\ g)\ N_2}{CO_2 + CO + CH_4}$

This is the ratio of carbon burnt at the tuyeres to total carbon gasified. The weight of carbon burnt before the tuyeres per weight of iron is:

$\frac{(.5291 + .0038\ g)\ N_2}{CO_2 + CO + CH_4} \times$ Carbon gasified in furnace.

The carbon gasified in the furnace is the sum of carbon charged in coke and in limestone minus the carbon in the pig iron and the carbon in flue dust.

Weight of Carbon Dioxide in Top Gases.

If all the iron were reduced by carbon monoxide according to the reaction: $Fe_2O_3 + 3\ CO = 2\ Fe + 3\ CO_2$, the weight of carbon that would exist as carbon dioxide can be easily calculated. It is 672 lbs. per ton of pig iron of 93 per cent iron.

It is thought that something may be learned from the difference between this figure (672 lbs.) and the actual weight of C as CO_2 in the top gases. This is calculated by the following formula which is self explanatory.

$$\text{C as } CO_2 \text{ in top gases} = \frac{CO_2}{CO_2 + CO + CH_4} \times \text{Carbon gasified in furnace.}$$

Generated on 2024-09-07 22:24 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Limits of Error in the Table.

(A) Coke charged. In the data furnished this may or may not include the coke breeze sieved out as the coke leaves the chutes.

(B) The carbon in the flue dust has, probably, not been deducted in the table; this may amount to 3 per cent of the carbon charged and would make an error, in the coke used otherwise than at the tuyeres, of about 10 to 12 lbs. per ton of pig iron.

(C) The carbon charged as coke. The analysis of the coke given in many of these examples is apparently on the dry coke, whereas, the weight of coke charged is in the "natural state." If the moisture in the coke be 3 per cent, this would make an error in the carbon used otherwise of about 10 to 12 lbs.

(D) Gas analysis. If the CO_2 and CO are reported .5 per cent (due to the sample being taken over unsaturated water) the carbon burnt before the tuyeres is 30 lbs. less than that calculated from the incorrect analysis, the carbon used otherwise, is therefore, 30 lbs. more than the calculated result.

(E) The amount of moisture in the blast also has an effect on the calculations. In the calculations of the data of Bureau of Mines, the moisture was assumed as 3 grains per cu. ft. If this were low and 4 grains is the correct figure, the carbon burnt before the tuyeres is 10 lbs. more than that calculated and the carbon used otherwise is 10 lbs. less than the calculated.

As a summary, the carbon used otherwise than at tuyeres may be in error as follows.

		Per Ton Pig Iron
(A)	Carbon in coke screened out.....	+10 lbs.
(B)	Carbon in flue dust about .6%.....	+12 lbs.
(C)	Carbon in coke, due to moisture (3%)	+10 lbs.
(D)	CO_2, .5% low in gas analysis.....	—30 lbs.
(E)	Increase of 1 grain moisture in blast	+10 lbs.

Error in calculating weight of carbon as dioxide in the top gas. An error of .5 per cent low CO_2 in analysis causes an error of 17 lbs. carbon as CO_2 in the top gases. Any error in the carbon gasified would reflect here; the carbon as dioxide being about one-third the carbon gasified, an error of 60 lbs. in carbon gasified would mean an error of 20 lbs. in carbon as dioxide, both errors are positive and the sum of possible errors is about 37 lbs.

Discussion of Table.

The results show that the carbon used otherwise than at the tuyeres is more than the sum of that required for reduction of metalloids, for impregnation and "the solution loss" equal to the carbon in the stone. The carbon dioxide in most cases is less than that resulting from the reduction by carbon monoxide, showing that "solution loss" has occurred and that the "solution loss" is more than equal to the carbon in the limestone.

The conclusion is reached that iron is reduced in the top of the furnace by carbon monoxide but that the carbon dioxide resulting, as also the carbon dioxide from limestone, causes a solution loss.

These tests show (column 13) that the solution loss, in addition to loss equal to the carbon in limestone, varied from nothing in a few instances to 185 lbs. The carbon used otherwise than at tuyeres varied from 209 lbs. to 390 lbs., of which 140 lbs. were used for reduction of metalloids and for impregnation, and the larger part of the remainder was lost by "solution".

New President of Mesta Machine Company

Mr. F. E. Mesta has been elected president and general manager of the Mesta Machine Company, Pittsburgh, Pa.

He received his early education in the public schools of Bethel Township, Allegheny County, Pa., and graduated from the High School of Leechburg, Pa. His practical experience in the iron and steel business was obtained in the plant of the Leechburg Foundry & Machine Company, Leechburg, Pa. He later took up engineering and went into the engineering department of the Leechburg Foundry & Machine Company; afterwards, going on the road as selling representative of this company, as well as having charge of their outside erecting work.

F. E. Mesta

In 1898, he took charge of the construction of the present plant of the Mesta Machine Company, at West Homestead, Pa, and was made general superintendent when the plant was put into operation

In April, 1912, he was elected director and vice president of the Mesta Machine Company, in charge of operations, which position he held until his recent election as president and general manager, after the death of his brother, Mr. George Mesta.

Generated on 2024-09-07 22:17 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

THE SAFETY CRUSADE

Causes of Accidents in Material Handling*

By DAVID S. BEYER†

THIS might well be called the Age of Statistics. We can find statistics telling how much cream and sugar to use on our baked apple in the morning, in order to get enough calories to give us the necessary wallop during the forenoon; statistics on the number of microbes of various kinds we will absorb in the subway on our way to the office; a library full of statistics on how to run our business when we get there; statistics in the evening papers on the number of sets of whiskers in Congress; and we sometimes long for the good old days before printing presses, statisticians and other modern inconveniences were invented.

Perhaps you all remember Mark Twain's little adventure into the vital statistics issued by the Government; he found that for every person killed in a railroad accident 50 died in bed, and decided that what he needed most was not insurance against railroad accidents but against beds!

However, in spite of the odd-looking results we sometimes see from the use (or abuse) of statistical figures, the fact remains that the engineer couldn't very well get along without them, and I will give you a few such figures to indicate how important a part of the whole accident problem the handling of material really is.

Statistics on Material Handling.

The report of the Massachusetts Industrial Accident Board covering all accidents in the state for the year ending June 30, 1922, shows the following results:

	No. of Accidents	Lost Time, Days Excluding Deaths	No. of Deaths
Total for Mass.....	51,105	2,216,142	306
Handling material..	14,916—29%	449,469—20%	19—6.2%

Another way of stating this is to say that the lost time caused by accidents from handling material (on the basis of 300 working days per year) is equivalent to 1,498 men being laid off continuously throughout the year in one state from this cause alone. If we figure the 19 fatalities at a total of 6,000 days each, the rating used by the Massachusetts Industrial Accident Board, this would add 380 more men to the list, bringing the total to nearly 2,000.

Both the number and per cent of deaths and other injuries from handling objects in Massachusetts was almost identical for the previous year, that is, 14,970, or 28 per cent of all accidents, and the percentage of all fatalities was 6.1. (It may be noted in passing that the per cent of days lost is somewhat lower than the numerical percentage of accidents, indicating that the average accident from handling material is somewhat less severe than the average from other causes; for example, 37 days per case for handling objects, compared with 120 for machinery.)

A large volume of accident data tabulated by the Pennsylvania Compensation Rating and Inspection Bureau shows 22 per cent of the accidents due to this cause.

We may accordingly conclude that approximately one-fourth of all industrial accidents in a typical manufacturing state are due to handling material, so it is an important subject to the safety engineer.

Dividing the Massachusetts accidents into further cause classifications we find the following results:

Cause of Accident	Number	Per Cent of Total
Strains	4,499	30
Injured on sharp or rough objects	3,366	23
Objects dropped	2,217	15
Caught between object handled and other objects	1,455	10
Injured on hand trucks, wheelbarrows, etc.	1,090	7
Objects falling from load (while loading or unloading)	614	4
Objects falling from pile (while piling or unpiling)	118	1
Miscellaneous	1,557	10
Total	14,916	100

These classifications are rather general, but a few important points stand out:

Strains.

The large number of strains found in this list suggests immediately the possibility that men are being called upon to lift loads that are too heavy to handle with safety.

The Massachusetts data does not show how many of these strains resulted in hernia but a separate analysis of several hundred material handling accidents reported to the Liberty Mutual Insurance Company shows that hernia resulted in one-third of the total cases of strains reported, death following in several cases.

Some of the injuries show the desirability of mechanically operated hoists, conveyors, trucks and other devices, for handling the burden that is too great for the ordinary human mechanism. However, mechanical devices seem to play a minor part in this particular field and an outstanding feature of these accidents is the importance of the human element. Most of them are a kind that might have happened to the dusky workmen who hewed King Tut's tomb out of the rock or fashioned Cleopatra's barge.

I once asked a famous archaeologist, who had spent many years studying Egyptian lore, whether he found any record of the accidents that occurred during the building of the pyramids, for example. He

*Paper delivered at joint session Engineering Section, National Safety Council, and American Society of Safety Engineers, New York City.

†Vice President and Chief Engineer, Liberty Mutual Insurance Company, Boston, Mass.

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

told me that there were occasional references to the fact that large numbers of people died during the work, but human life was valued so cheaply there was probably no effort made to keep any individual account of the persons killed.

I suppose there was another difficulty, owing to the fact that memoranda of that day were made principally on bricks, and I have no doubt that a card index of the accidents occurring during the building of one pyramid would have made another pyramid!

Safety vs. Carelessness. The upper figure shows a snubbing post on the loading dock to convey safely heavy low trucks into a car. In the lower figure is shown a man pulling a truck. If he should slip he must invariably suffer injury, because the height of the load obstructs the vision of the men behind, who are pushing with heads down.

Accidents occurring from "objects dropped," "objects falling from piles," "caught between objects handled," etc., all show the importance of personal carefulness on the part of the worker and his overseer, and will continue to be a problem for the safety engineer so long as there are materials to handle and persons to move them.

The Human Side of the Material-Handling Problem.

So much for the statistical side of the material-handling problem; let us now look at the human side. The definition of an engineer is a person by whom "the mechanical properties of matter are made useful to man in structures and machines." That sounds rather cold and forbidding, and from the nature of his work one might picture the engineer as having that impersonal feeling towards others which was shown by the negro minister who was baptizing his flock through the ice. He lost his grip on one of them as he dipped him under, and merely remarked, as he beckoned another victim forward, "The Lord giveth and the Lord taketh away!"

However impersonal may be the attitude of the mechanical, civil or electrical engineer toward the material with which he works, the safety engineer has a field that calls for the keenest human interest, because he is dealing with men rather than materials; his aim is to avoid human tragedy, rather than accomplish mere utility. His real dynamic power as a safety engineer will come from the knowledge that he is geared up directly with that greatest problem of all time, the accomplishment of human happiness.

The statistical divisions used in tabulating a large number of accidents are necessarily so general and lacking in detail as to lose most of their human interest and even their engineering value. In order to fill in some of the finer details of the picture I investigated a group of the fatal accidents from handling material which have been reported to the Liberty Mutual in the last four years. There were 16 of these cases, and the following information was gleaned from our files covering their investigation and adjustment.

Of the 16 deaths, seven, or nearly one-half, resulted from septicaemia or blood poisoning, in some cases supplemented by other diseases. (This is undoubtedly a higher proportion than would be found in a more general group of accidents, but it shows how important septicaemia is as a cause of fatalities in material handling.)

Six of these cases were from slight cuts on the hands, neglected until the injured person was so seriously infected that he had no chance. Several of these were of the kind that is so trying to the insurance man, where the injury was not reported at the time it occurred, and decision of an important case hinges upon whether the little scratch or cut was received at the factory or after the man went home.

Some of the causes given, were a scratch from a nail in a shoe, a cut from the edge of linoleum, from a pane of glass which was being set, from a nail in a plank which was being handled, etc.

In one case, erysipelas developed, and in another gangrene. This latter case occurred from a man dropping a small machine part, weighing only about a pound, on his foot, resulting in a slight injury which later became gangrenous.

Case No. 215,225 is that of a little grandfather from the Emerald Isle, 67 years of age. It was his job to carry bags and barrels of rands (small pieces of leather used in the heels of shoes) to the sorting room and to storage. These packages were rather heavy, weighing as much as 100 pounds each—and he had to lift them up onto a bench or onto storage piles as much as three to six feet from the floor.

Hardly a suitable job for a grandfather, we would say!

However, this one was considered hale and hearty and boasted that he had not seen a doctor for 40 years. He had been handling barrels and bags in this plant for several years when one day, after placing a barrel on the sorting table, he complained of a sudden pain in his stomach.

He apparently had a premonition that it was serious, for he turned to the sorter and said, "I guess my days of work are about over." His words were prophetic. He died next evening from an internal hemorrhage.

The autopsy showed chronic ulcers of the stomach, which, the surgeon said, had ruptured as a result of the strain from lifting a heavy barrel.

Generated on 2024-09-07 22:16 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Case No. 229,816. Two men were taking a casting weighing nine tons from a freight car, using chain falls and tackle. An eyebolt used to guide the casting broke, allowing it to swing and crush one of the workmen against a post. He died in about half an hour. As a result of this simple slip, Patrick, Francis, William, Helen, James and a baby are fatherless, and their mother a widow.

The bolt was seven-eights of an inch in diameter, and while it was intended to guide rather than lift the load, a sudden shock or jerk of the casting evidently strained it to the breaking point. The foreman had only been on this job about two months, and his judgment was apparently at fault in the use of the hoisting tackle or in not keeping his men in a safe position.

A very similar case was represented by report No. 148,862.

Here a couple of heavy plate castings (weighing about 3,000 lbs.) were being lifted by a chain and derrick. These castings were about 5x8 feet in size and were accordingly rather unwieldy.

A chain was put around them and they were turned up on edge, when the chain broke and one of the plates fell over towards a man who was adjusting a block underneath them. The flesh was stripped from one leg from the knee to the ankle, and he was pinned underneath the plate until a new chain could be rigged and the casting lifted from him. He was hurried to the hospital and died next day from shock.

I was unable to locate any further details as to the condition of the chain and do not know whether or not it was defective.

However, we are all familiar with the punishment that is commonly administered to chains when they are placed around a heavy, sharp-edged casting of this sort, and there is little doubt but that the accident was due to the combination of abuse of the hoisting tackle and unsafe placing of the workmen.

Accident No. 179,638 is one where swift and terrible punishment was visited on a man for his own disregard of a simple safety precaution.

This man, Tony B——, was an ash handler. He was a sober and industrious worker. He had been in this country about six years and receipts in his trunk showed that he had sent a dozen or more money orders for 1,000 to 2,500 lire each to his wife and son in Italy, besides contributing to his old father's support.

His plans for reaping the reward of his industry were already laid. He had given a steamship company the first instalment on a ticket, and in a month or so he was to return to his native land.

He was an ash handler in a large boiler plant and it was his duty to push a car of hot ashes as they came from the boiler furnaces onto an elevator, where they were taken to the ground level and dumped. There was a track on the elevator floor and a pin was provided to hold the car in place.

Perhaps he was thinking of his coming reunion with his family, or was he just plain "careless"? Anyhow, he neglected to put the safety stop in place, the ash car projected a little over the edge of the elevator floor, and when he started the elevator the ash car was caught by the edge on the edge of the floor above, knocking Tony from the elevator and then dumping the car full of red-hot ashes over him.

He was too badly hurt to help himself, and when some of the other boiler men noticed his plight a few minutes later, he was fatally burned.

One wonders in this case was it all Tony's fault or should his "boss" have noticed that he was not using the safeguard and insisted on his doing so?

Accident No. 187,630 refers to a shipper whose work consisted in packing beds and mattresses for shipment. He was a Russian and had been with the concern 18 years; one day, according to his own statement, the end of a spring cut one of his fingers. He felt badly next day and stayed away from work. By the time a surgeon was called in his whole system was saturated with infection, and he died after a losing fight of 48 days.

The history of this case begins with the young peasant who lived on a little farm in Russia, and married a girl on an adjoining farm. After many hardships he succeeded in reaching the land of promise, saving his earnings until he could bring his bride across the water. He worked industriously to establish a little home in this country—but everything he had built during these years of patient effort collapsed as the result of neglecting a tiny scratch on his little finger!

Case No. 243,784 concerned a husky pressman in a printing establishment. He was over six feet tall and assisted in handling rolls of paper weighing about 1,500 pounds; two or three men occasionally lifted one end of a roll or put a block under it.

One day he had been doing some such heavy lifting, but evidently did not realize that he had injured himself and started home, as one of his fellow workmen said, "jolly and laughing, just as he always was." A little later he was found dead in the doorway of the plant, and an autopsy showed that an artery near his heart had burst.

The examining surgeon in his report graphically describes how the vessel had bulged like an inflated inner tube of an auto tire, until it finally burst and allowed the blood to accumulate around his heart, causing a back pressure which quickly killed him.

There was evidence in this case that he had had heart trouble for some time, the valves being partially grown together. A thorough physical examination would probably have revealed this trouble and indicated the danger to him from a job in which he had to do such heavy lifting.

On the other hand, some mechanical device might have relieved the heavy strain of this work, so he could have continued on it and been alive today.

Case No. 196,953 is that of a man handling castings on a little platform truck alongside a driveway. An auto truck with a load of coal entered the driveway behind the man who was handling the castings. The driveway had a smooth surface of cinder and dirt and the approaching truck made little noise. The driver saw the workman, but did not blow his horn or give any signal, as he thought he could pass by with a couple of feet clearance.

A box slipped from the hand truck just as the auto approached, and the trucker stepped backwards to get in a better position to replace it, evidently not hearing the auto. Several workmen were around and two of them cried "Look out," but it was too late. The trucker was struck by the front of the automobile and spun around; unable to regain his balance,

Generated on 2024-09-07 22:14 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

he fell, double up, in front of the rear wheel of the auto, which dragged him several feet and caused internal injuries from which he died within an hour. He was a Canadian workman and left a widow and three children.

The men working about this casting yard knew that trucks were passing frequently, and there had been comments on their speed. Momentary lack of watchfulness on the part of the man who was killed was one cause of the accident, but a blast from the chauffeur's horn as he approached the unsuspecting workman might also have averted the tragedy.

While case No. 204,059 is classified as a material handling accident, it also involved railroad equipment.

A man was shoveling slag from an open box car on siding No. 1, with siding No. 2 adjacent to it. A train crew "kicked" a coal car which was intended for siding No. 2 in from the main line. The switch on the track where the man was working was open, however, and his car was struck by the one being shifted.

The jolt threw him backwards over the end of one car and he was crushed by the other, although the total car movement was only a few feet.

This seems to be a clear case of carelessness on the part of the train crew, as they had been previously cautioned against bumping into cars on the siding without warning, and the moving car was thrown in from the main line with no brakeman on it.

Accident No. 131,249 was another case where a man was unloading cars. A track repair gang was working alongside, cutting a piece off a 30-foot steel rail. After nicking it with a chisel, they planned to lift it in the air and drop it on another rail to break off the piece.

The rail was heavy and Dominic was asked to help lift it. The foreman in charge of the rail-breaking operation was named Murphy, but he asked Dominic's foreman, another Italian, to explain that the men should step back when the rail was dropped. Either the instructions were not clear or Dominic misunderstood them, because, instead of stepping back from the rail, he stepped forward towards it when it was dropped, and tried to hold it. He was pinned under the 600-pound weight and lived only a few minutes.

Age as It Affects These Accidents.

One feature of these accidents that impressed me was the advanced age of the men. Only one of them was less than 37 years old, three were 58 and three others ranged from 60 to 70 years. The average was a trifle under 50 years.

I believe that men who have grown old in industry should be allowed to remain at work as long as they can do so with safety and profit to themselves, but this list of cases shows the importance of finding a job for them suited to their advancing years.

When we put a man whose arteries are hardening or whose limbs have lost their strength and agility at work where heavy lifting is required, and where ability to make a quick movement may spell the difference between safety or disaster, we are not doing a kindness to the man; we are exposing both him and ourselves to great loss.

My general feeling is that anyone looking over the descriptions of these accidents could not help but be impressed with the feeling that practically every one of these casualties of industry was unnecessary. They represent a mere tiny fraction of the total casualties to one insurance company, from one cause, in a single state, over a limited period, yet this little package of 16 yellow cards stands for the loss of $50,000 in compensation and medical payments alone.

But of course the financial loss is of minor importance compared to the irreparable damage to the victims and their families. **This group of 16 men left behind them 12 widows, and 28 fatherless children!**

So the problem of handling material shows itself to be essentially a human problem of a kind that should make a special appeal to the safety engineer in his fight against accidents. It has been an interesting study to me and I hope it will prove so to others. The principal lessons to be learned from this study seem to be:

1—The important place which the foreman holds in such work. When heavy objects are being handled the lives of his men may be imperilled at any moment by lack of judgment or proper caution on his part.

2—The necessity for selecting the man for the job, so that individuals with heart trouble or other organic weaknesses or disease will not be placed in work where this weakness may endanger their lives.

3—The importance of prompt antiseptic treatment of the small cuts and scratches which inevitably occur where rough objects are being handled.

4—The use of mechanical appliances wherever they can be adopted, for handling heavy weights, and the frequent inspection of such appliances in use to see that they are not allowed to get out of order or to be used improperly.

Top Roll Drive

United Engineering & Foundry Company has just issued an interesting bulletin on their new top roll drive for balanced sheet and jobbing roughing mills. The subject is introduced as follows:

"To meet the demand for some way of driving the top rolls on balanced roughing stands in sheet mills which would not be as cumbersome and expensive as the usual pinion housing with the necessary spindles and spindle carriers, we have developed and built the drive illustrated and described in this bulletin. It has proved to be a distinct step forward in modern sheet mill equipment and has attracted very favorable comment from various sheet mill operators.

It consists of a gear drive with a one to one ratio; the bottom gear being keyed to the bottom spindle and the top gear connected to the top shaft by means of an adjustable friction. Both gears are entirely enclosed by a cast gear case which is carried through springs by a spindle carrier frame which fits on the shoe plate of the mill, all as shown by illustrations on pages 8 and 9. The gears being totally enclosed, run in grease, insuring smooth operation and minimum wear. As indicated by the illustrations the adjustment of the friction for the top gear is just outside the case at the top where it is readily accessible.

The drive including the bottom spindle being a self-contained unit, may be removed without removing any bolts exactly as an ordinary spindle, i. e., there are no connections to remove except the coupling boxes. The various illustrations show clearly how the drive looks in relation to the mill."

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Combustion of Coke at the Tuyere Level of the Blast Furnace*

First of a Series of Determinations Made by the Bureau of Mines

By S. P. KINNEY†

A series of gas samples was taken at the tuyere plane of 14 blast furnaces in 1922, and results from 10 of these have been reported.‡ These results definitely proved that the combustion of the coke in the hearth of the blast-furnace is complete at a distance of 32 to 40 in. from the nose of the tuyere. The distance is one measured on a horizontal line between the center of the nose of tuyere and the center of the furnace at the level of the tuyere. Some discussion resulted as to the extent of penetration of the combustion zone vertically§ and as to the extent of penetration of the combustion zone with variation in the amount of air blown. This present report deals with the latter phase.

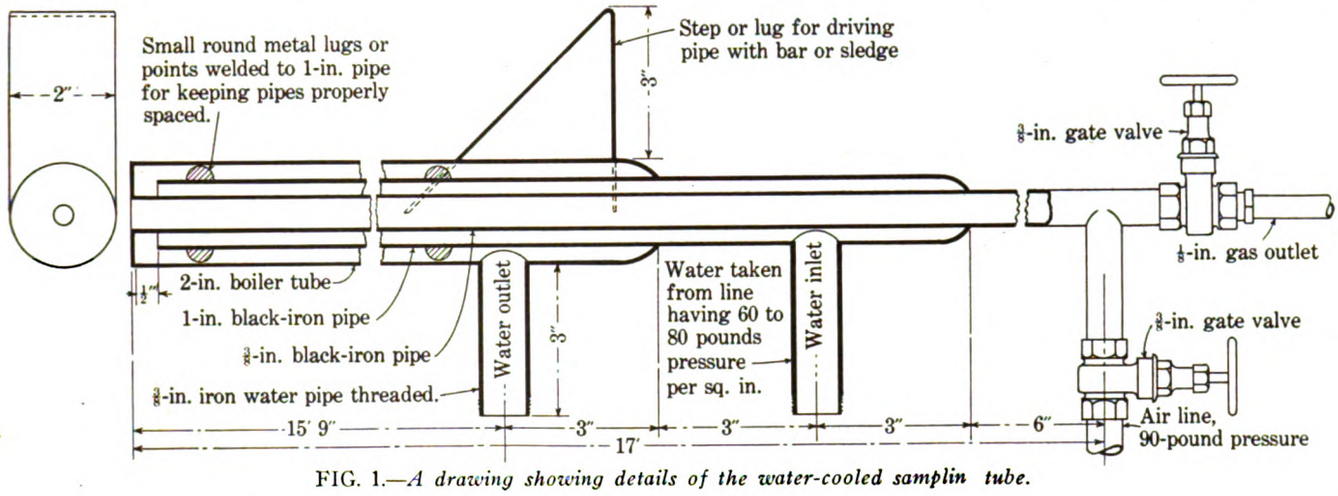


FIG. 1.—*A drawing showing details of the water-cooled samplin tube.*

In general, operators believe that the combustion zone of the furnace extends to the center of the furnace at the tuyere level, and that the coke is burning freely and uniformly throughout the tuyere level. It is also believed that if combustion is not proceeding uniformly across the tuyere level of the furnace an increase in air pressure will carry the combustion zone to the center of the furnace. For the purpose of clearing up some of these points the sampling of the 10 furnaces mentioned was conducted. This work has been extended to four other furnaces and results from two are here reported.

To determine the extent of penetration of the combustion zone with a variation in air pressure it would be desirable to double the blowing capacity of the engines at some blast furnaces, but as this was not practicable in this case it was decided to reduce the blowing pressure to a minimum, and then make a survey of the hearth area.

Description of Furnaces.

The two furnaces (Nos. 1 and 2 in this report) selected for the investigation were of 300-ton capacity each, making basic iron and operating on Northern ore, and coke made in Semet-Solvay ovens from Kentucky coal.

The furnaces were similar in construction and were operated under similar conditions. Some furnace data are given in Table I following:

TABLE I — *Furnace Data.*

	No. 1.	No. 2.
Hearth diameter, ft.	13½	13½
Bosh, ft	18	18
Stock line, ft.	12½	12½
Tuyeres, number	8	8
Air blown, at 60 deg. F., cu. ft. per min.	28,789	26,625
Blast pressure, lb. per sq. in.	12 to 14	12 to 14
Blast temperature, deg. F.	900 to 1100	1000 to 1250
Top temperature, deg. F.	180 to 550	170 to 450
Make per day, tons of iron	316	314

Method of Sampling and Apparatus Used.

As the method used in obtaining the gas samples, by means of water-cooled sample tubes has been previously described,* a short description here will suffice.

*Published with approval of the Director, Bureau of Mines, Department of the Interior.

†Associate Metallurgist, North Central Experiment Station, Bureau of Mines, Minneapolis.

‡Perrott, G. St. J., and Kinney, S. P., Combustion of coke in the blast-furnace hearth; Trans. Amer. Inst. Min. and Met. Engrs., vol. 69, 1923, pp. 543-586.

§Johnson, J. E., in his work, "Principles, Operation and Products of the Blast-Furnace", pp. 3 and 151 (McGraw-Hill Book Co., 1918, 551 pp.), states that the oxygen in the blast is not consumed until the gases reach the top of the bosh. This would mean that combustion is not complete until this point is reached. The present writer believes that there is no reason why the blast should penetrate any farther in a vertical direction than in a horizontal one.

*Perrott, G. St. J., and Kinney, S. P. Work cited.

Generated on 2024-09-07 22:14 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The water-cooled sample tube shown in Fig. 1 was driven through the tuyere of the furnace by means of a dolly-bar. Compressed air was used on the center, or gas line, to prevent stoppage with slag or other fused material. When the tube had been driven to the center of the furnace, the air was disconnected, and a rubber tube was connected to the ⅛-in. gas outlet pipe. This tube was lead to a point where the samples were taken (Fig. 2). A small hook made of ⅛-in. iron pipe was attached to the end of the rubber tube. At each setting of the sample tube, gas samples were collected over mercury in 4-oz. wide-mouth bottles. The bottles were closed with rubber stoppers. After the sample had been taken the bottle was inverted and set in a shallow trough of water. The water acted as a secondary seal. A small amount of mercury was left in each bottle. When the bottle was inverted the mercury acted as a seal and a covering for the rubber stopper. The apparatus is shown in Fig. 2.

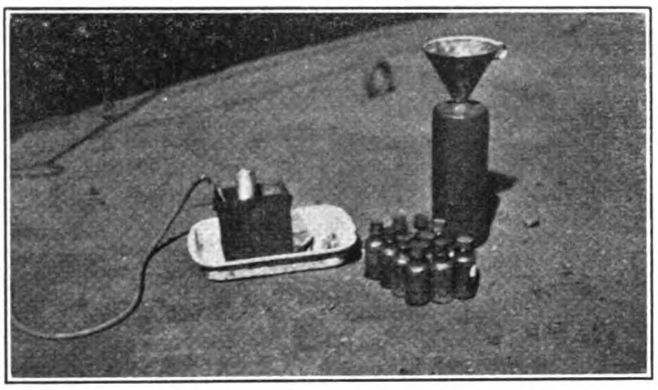


FIG. 2.—*Equipment used in collecting samples.*

Analyses were made in a modified Orsat apparatus of the Burrell type. Two pipettes of the bubbling type, containing acid cuprous chloride, were used for the determination of carbon monoxide.

Results of Experiments.

Tables 2, 3, and 4, and Figs. 3, 4, and 5 give details of the results of gas samples taken at the tuyere level of Nos. 1 and 2 furnaces.

TABLE II.

Analyses of Gas Samples taken at Tuyere Plane of No. 1 Furnace, Per Cent (Blast Pressure 14 lb.)

Distance from nose of tuyere Inches	CO_2	O_2	CO	H_2	N_2	Time	Date
–8	0.0	20.6	0.0	0.0	79.4	.....	4-3-23
	0.0	20.9	0.0	0.0	79.1	.....	4-3-23
	0.0	20.8	0.0	0.0	79.2	.....	4-4-23
Average	0.0	20.9	0.0	0.0	79.2		
–4	0.0	20.6	0.0	0.0	79.4	.....	4-3-23
	0.0	20.9	0.0	0.0	79.1	.....	4-4-23
Average	0.0	20.8	0.0	0.0	79.2		
0	2.5	13.4	0.0	0.0	84.1	9:17 a.m.	4-3-23
	2.7	14.6	1.0	0.0	81.7	.....	4-3-23
	1.6	17.2	1.0	0.0	80.2	1:22 p.m.	4-4-23
	1.7	17.6	0.0	0.0	80.7	1:23 p.m.	4-4-23
Average	2.1	15.7	0.5	0.0	81.7		
4	1.8	16.3	0.0	0.0	81.9	9:21 a.m.	4-3-23
	3.7	11.0	0.5	0.0	84.8	.....	4-3-23
	6.5	5.9	0.0	0.0	87.6	9:08 a.m.	4-3-23
	2.6	13.5	0.0	0.0	83.9	1:22 p.m.	4-4-23
Average	3.8	11.7	0.1	0.0	84.4		
8	8.6	1.5	7.3	0.0	82.6	9:07 a.m.	4-3-23
	2.9	14.3	0.0	0.0	82.8	9:20 a.m.	4-3-23
	4.9	11.0	0.0	0.0	84.1	9:18 a.m.	4-3-23
	0.8	6.3	2.6	0.1	90.2	1:21 p.m.	4-4-23
Average	4.3	8.3	2.5	0.0	84.9		
12	7.1	1.9	5.3	0.8	84.9	9:18 a.m.	4-3-23
	5.3	5.5	3.4	0.5	85.3	1:20 p.m.	4-4-23
	6.6	3.2	2.0	1.6	86.6	9:07 a.m.	4-3-23
Average	6.3	3.5	3.5	0.9	85.8		
16	4.2	1.5	10.4	0.6	83.3	.....	4-3-23
	4.9	2.5	3.1	3.1	86.4	9:06 a.m.	4-3-23
	5.9	0.0	11.8	0.6	81.7	1:18 p.m.	4-4-23
Average	4.7	1.3	8.4	1.4	84.2		
20	11.1	0.8	6.7	0.3	81.1	9:08 a.m.	4-3-23
	11.4	0.0	11.1	2.3	75.2	9:17 a.m.	4-3-23
	7.6	0.0	10.6	0.4	81.4	.....	4-3-23
	6.6	0.0	16.6	0.7	76.1	1:18 p.m.	4-4-23
Average	9.2	0.2	11.2	0.9	78.5		
24	9.8	0.0	12.3	0.8	77.1	9:04 a.m.	4-3-23
	10.8	2.4	8.7	2.7	75.4	9:16 a.m.	4-3-23
	6.6	0.2	16.5	1.2	75.5	1:16 p.m.	4-4-23
Average	9.1	0.8	12.5	1.5	76.1		
28	1.2	0.3	25.6	0.9	72.0	9:03 a.m.	4-4-23
	8.3	0.6	39.2	0.8	51.1	.....	4-4-23
Average	2.4	0.4	32.4	0.8	64.0		
32	2.9	1.8	26.5	1.6	67.2	9:03 a.m.	4-3-23
36	0.6	1.4	33.4	1.3	63.3	9:01 a.m.	4-3-23
40	0.0	0.0	37.7	1.4	60.9	9:01 a.m.	4-3-23
44	1.3	0.3	55.4	0.0	43.0	9:01 a.m.	4-3-23
48	0.0	2.5	42.7	0.7	54.1	9:59 a.m.	4-3-23
52	0.0	0.0	52.1	0.7	47.2	8:59 a.m.	4-3-23
56	0.0	0.0	63.5	1.4	35.1	9:58 a.m.	4-3-23
60	0.0	0.0	64.3	0.7	35.0	8:57 a.m.	4-3-23
64	0.3	0.0	67.0	1.6	31.1	8:56 a.m.	4-3-23
68	0.3	0.3	65.9	2.1	31.4	8:56 a.m.	4-3-23
72	0.0	0.8	69.0	1.0	29.2	8:55 a.m.	4-3-23
76	0.0	0.5	64.5	1.1	33.9	8:54 a.m.	4-3-23
80	0.0	0.3	57.0	0.6	42.1	8:53 a.m.	4-3-23
84	0.3	0.0	47.8	0.6	51.3	8:53 a.m.	4-3-23
88	0.0	0.3	40.3	0.9	58.5	8:51 a.m.	4-3-23
92	0.3	0.8	40.8	0.5	57.6	8:50 a.m.	4-3-23
Top	12.9	0.0	27.4	3.1	56.6	2:30 p.m.	4-3-23
	13.0	0.0	27.5	2.0	56.6	3:00 p.m.	4-3-23
	12.3	0.0	27.6	3.2	56.9	4:00 p.m.	4-3-23
	13.5	0.0	26.6	3.2	56.7	1:45 p.m.	4-4-23
	13.5	0.0	26.6	3.2	56.7	1:45 p.m.	4-4-23
Average	13.0	0.0	27.1	3.1	56.8		

TABLE II — (*Continued*)

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

TABLE III.

Anayses of Gas Samples taken at Tuyere Plane of No. 2 Furnace, Per Cent (Blast Pressure, 14 lb.)

Distance from nose of tuyere Inches	CO_2	O_2	CO	H_2	N_2	Time	Date
–8	0.0	20.8	0.0	0.0	79.2	.....	4-2-23
	0.0	20.9	0.0	0.0	79.1	.....	4-2-23
Average	0.0	20.8	0.0	0.0	79.1		
–4	0.0	20.9	0.0	0.0	79.1	.....	4-4-23
	0.0	20.8	0.0	0.0	79.2		
Average	0.0	20.9	0.0	0.0	79.1		
0	0.3	17.4	0.0	0.0	82.3	.....	4-2-23
	0.0	18.2	0.0	0.0	81.8	.....	4-2-23
	0.3	16.6	0.0	0.0	83.1	.....	4-4-23
	0.3	17.7	0.0	0.0	82.0	.....	4-4-23
	1.2	19.6	0.0	0.0	79.2	.....	4-4-23
Average	0.4	17.9	0.0	0.0	81.7		
4	1.4	18.3	0.0	0.0	80.3	.....	4-2-23
	2.3	18.6	0.0	0.0	79.1		
	7.3	11.9	0.0	0.0	80.8	10:18 a.m.	
Average	3.3	16.2	0.0	0.0	80.5		
8	5.9	8.2	0.6	0.0	85.3	.....	4-2-23
	9.6	4.9	2.2	0.0	83.3	10:47 a.m.	4-2-23
	2.2	11.6	0.0	0.0	86.2	10:10 a.m.	4-2-23
	2.7	16.7	0.0	0.0	80.6	10:11 a.m.	4-2-23
	7.2	13.6	0.0	0.0	79.2	10:18 a.m.	4-4-23
Average	5.5	11.0	0.5	0.0	83.0		
12	9.6	1.1	2.7	0.0	86.6	10:47 a.m.	*4-2-23
	7.0	1.4	0.6	0.0	91.0	10:14 a.m.	4-2-23
	6.1	10.6	0.0	0.0	83.3	10:12 a.m.	4-4-23
Average	7.4	4.3	1.1	0.0	87.2		
16	0.0	8.7	7.7	0.7	82.9	.....	4-2-23
	12.0	0.3	4.3	0.2	83.2	10:14 a.m.	4-2-23
	7.2	4.0	2.0	0.0	86.8	10:31 a.m.	
Average	6.4	4.3	4.6	0.3	84.4		
20	11.4	0.7	8.1	0.0	79.8	10:13 a.m.	4-2-23
24	12.1	1.6	13.4	0.3	72.6		
	12.5	6.8	6.7	0.0	74.0		
Average	12.3	4.2	10.0	0.2	73.3		
28	0.5	1.3	36.4	0.6	61.2	10:47 a.m.	
32	0.5	0.0	39.6	1.2	58.7	10:43 a.m.	4-2-23
	0.9	0.9	29.7	0.7	67.8	10:09 a.m.	4-2-23
	1.2	0.3	32.6	0.5	65.4	10:10 a.m.	4-2-23
Average	0.8	0.4	33.9	0.8	64.1		
36	0.0	0.3	34.6	0.7	64.4	10:08 a.m.	4-2-23
	1.1	0.6	31.8	0.7	65.8	10:11 a.m.	4-2-23
	0.6	2.4	33.2	0.7	63.1	.....	4-4-23
Average	0.6	1.1	33.2	0.7	64.4		
40	0.0	0.0	44.0	0.7	55.3	10:08 a.m.	4-2-23
	9.8	0.8	30.6	0.0	58.8	.....	4-2-23
	1.7	0.0	32.2	0.0	66.1	8:57 a.m.	4-4-23
Average	3.8	0.2	35.6	0.2	60.2		

*Casting.

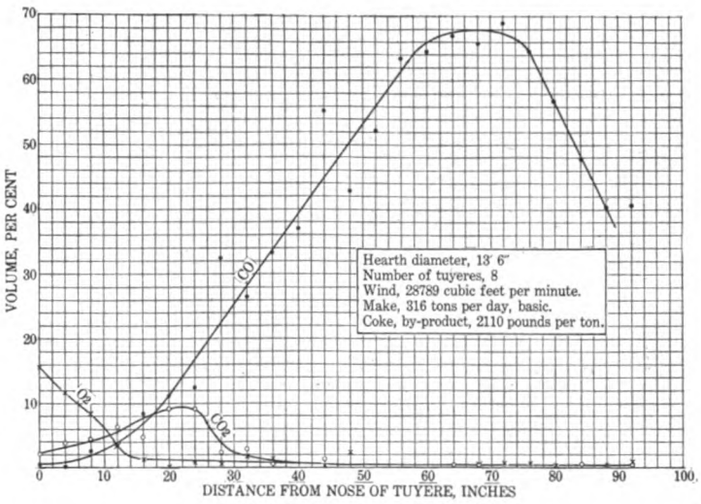


Figure 3 - Results of gas samples taken at the tuyere level of No 1 furnace. Blast pressure 14 pounds.

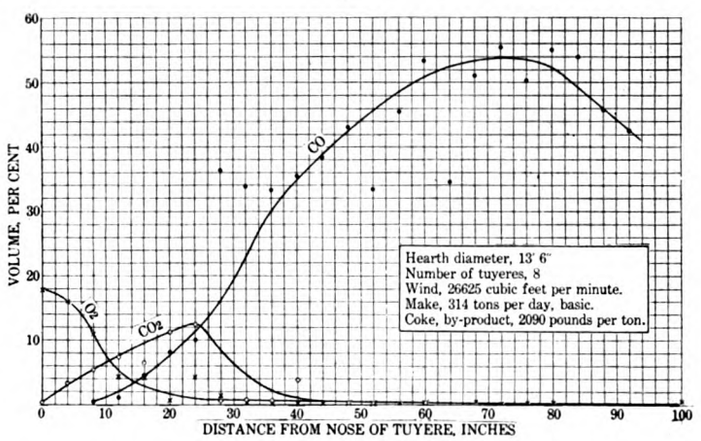


Figure 4 - Results of gas samples taken at the tuyere level of No 2 furnace. Blast pressure, 14 pounds.

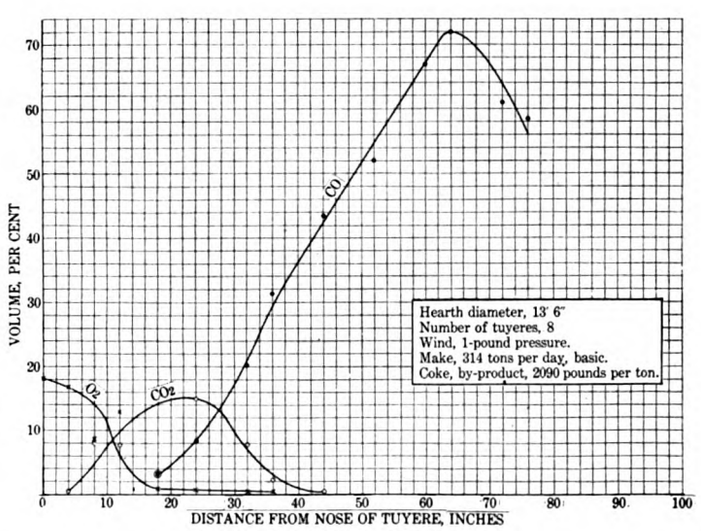


Figure 5 - Results of gas samples taken at the tuyere level of No 2 furnace. Blast pressure, 1 pound

FIGS. 3, 4, 5.—*Curves showing the results of gas samples from three different furnaces.*

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

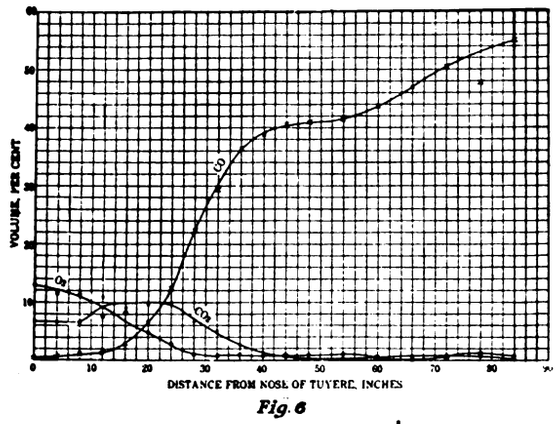


Fig. 6

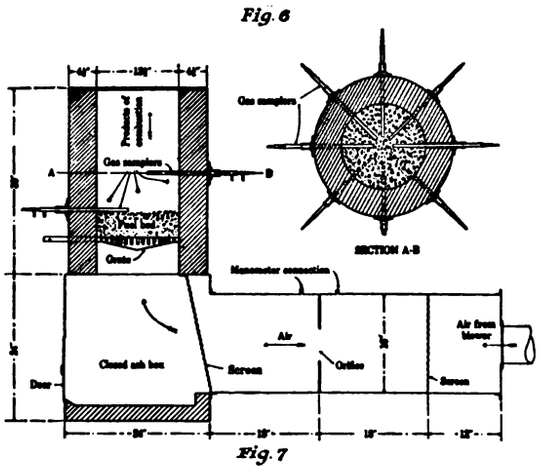


Fig. 7

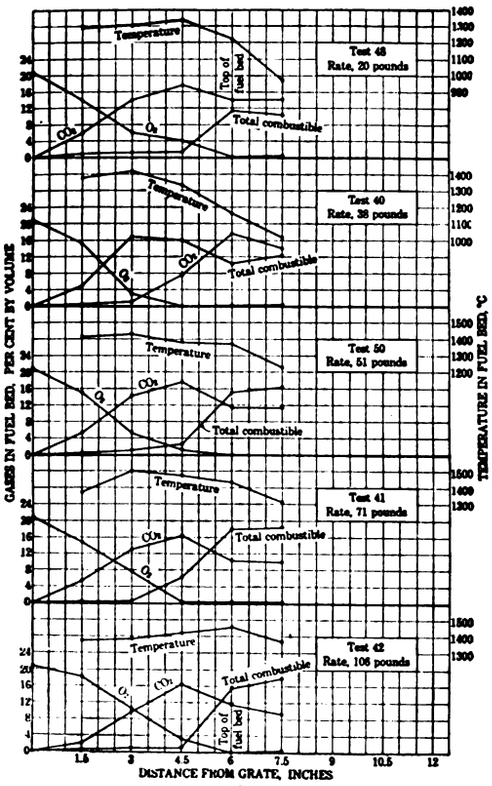


Fig. 8

FIG. 6.—*Curves from ten furnaces.* FIG. 7.—*Elevation and plan of the bureau's combustibility furnace.* FIG. 8.—*Curves showing results for tests for a metallurgical coke.*

TABLE III — (*Continued*)

Distance from nose of tuyere Inches	CO_2	O_2	CO	H_2	N_2	Time	Date
44	0.0	0.0	41.7	0.3	58.0	10:06 a.m.	4-2-23
	0.0	1.4	29.8	0.5	68.3	.....	4-4-23
	0.0	2.2	46.8	0.7	50.3	.....	4-2-23
Average	0.0	1.2	39.4	0.5	58.9		
48	0.0	0.0	59.0	0.7	40.3	.....	4-2-23
	0.0	0.0	47.5	0.5	52.0	10:06 a.m.	4-2-23
	0.0	2.2	31.9	0.0	65.9	10:40 a.m.	4-2-23
	0.9	0.3	34.0	0.6	64.2	9:55 a.m.	4-4-23
Average	0.2	0.6	43.1	0.5	55.6		
52	0.0	0.8	35.2	0.6	63.4	10:40 a.m.	4-2-23
	0.3	2.4	31.6	0.2	65.5	9:53 a.m.	4-4-23
Average	0.2	1.6	33.4	0.4	64.4		
56	0.0	0.0	61.2	0.6	38.2	10:02 a.m.	4-2-23
	0.0	1.4	41.6	0.6	56.4	10:39 a.m.	4-2-23
	0.0	0.0	34.0	0.2	65.8	8:58 a.m.	4-4-23
Average	0.0	0.4	45.6	0.3	53.7		
60	0.0	0.0	65.8	0.5	33.7	10:02 a.m.	4-2-23
	0.3	1.3	57.9	0.8	39.7	10:36 a.m.	4-2-23
	0.3	0.9	36.4	2.5	59.9	8.40 a.m.	4-4-23
Average	0.2	0.7	53.3	1.2	44.6		
64	0.0	0.0	34.4	3.7	61.9	8:48 a.m.	4-4-23
68	0.0	0.5	64.0	0.7	34.8	10:00 a.m.	4-2-23
	0.0	0.0	38.4	1.4	60.2	9:41 a.m.	4-4-23
Average	0.0	0.5	51.2	1.0	47.3		
72	0.0	0.3	67.0	0.4	32.3	9:59 a.m.	4-2-23
	0.0	0.0	44.0	0.3	55.7	9:44 a.m.	4-4-23
Average	0.0	0.2	55.5	0.4	43.9		
76	0.0	0.5	69.4	0.7	29.4	9:59 a.m.	4-2-23
	0.0	0.5	55.2	0.8	43.5	9:58 a.m.	4-2-23
	0.0	0.0	46.5	0.7	52.8	9:35 a.m.	4-4-23
	0.0	0.3	30.0	0.0	69.7	.....	4-4-23
Average	0.0	0.3	50.2	0.5	49.0		
80	0.0	0.3	55.2	0.0	44.5	9:57 a.m.	4-2-23
84	0.0	0.0	54.0	0.5	45.5	9:56 a.m.	4-2-23
88	0.0	0.0	46.4	0.6	53.0	9:50 a.m.	4-2-23
	0.0	0.0	45.2	0.7	64.1	9:55 a.m.	4-2-23
Average	0.0	0.0	45.8	0.7	53.5		
92	0.0	0.0	43.0	0.6	56.4	9:49 a.m.	4-2-23
	0.0	0.0	42.5	0.5	57.0	9:47 a.m.	4-2-23
Average	0.0	0.0	42.7	0.5	56.8		
Top	12.7	0.0	25.2	1.8	60.3	11:30 a.m.	4-2-23
Top	12.6	0.0	26.3	1.9	59.2	9:30 a.m.	4-2-23
Top	12.5	0.0	27.0	3.1	57.4	11:30 a.m.	4-4-23
Top	12.5	0.0	27.2	3.0	57.3	1:30 p.m.	4-4-23
Average	12.6	0.0	26.4	2.5	58.5		

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

TABLE IV.

Analyses of Tuyere Gas Samples taken at the Tuyere Level of No. 2 Furnace, Per Cent (Blast Pressure, 1 lb.)

Distance from nose of tuyere Inches	CO_2	O_2	CO	H_2	N_2	Time on 4-5-23
−8	0.0	20.8	0.0	0.0	79.2	9:39 a.m.
−4	0.0	20.9	0.0	0.0	79.1	9:39 a.m.
0	0.0	18.1	0.0	0.0	81.9	9:36 a.m.
4	0.3	16.9	0.0	0.0	82.9	9:35 a.m.
8	8.0	8.9	0.0	0.0	83.1	9:34 a.m.
12	7.8	13.0	0.0	0.1	79.1	9:32 a.m.
18	3.2	0.9	3.2	0.0	92.7	9:30 a.m.
24	15.0	0.8	8.3	0.0	75.9	9:29 a.m.
32	7.8	0.3	20.2	0.4	71.3	9:27 a.m.
36	2.2	0.3	31.4	0.4	65.7	9:26 a.m.
44	0.3	0.0	43.5	0.4	55.8	9:24 a.m.
52	0.0	0.0	52.0	0.0	48.0	9:23 a.m.
60	0.0	0.0	67.0	0.0	33.0	9:22 a.m.
64	0.0	0.0	72.0	0.0	28.0	9:21 a.m.
72	0.0	0.0	61.0	0.6	38.4	9:20 a.m.
76	0.0	0.0	58.5	0.0	41.5	9:20 a.m.

Discussion of Results.

Examination of the foregoing figures and curves, representing the results of gas sampling in Nos. 1 and 2 furnaces at normal working pressure (14 pounds) and No. 2 furnace at 1 pound pressure, will result in the conclusion that the general form of the curves is quite similar. Comparison of these results with the average results from 10 furnaces, as shown in Fig. 6, will lead to a similar conclusion. The extent of penetration of the combustion zone in all cases is approximately 40 inches, regardless of whether the furnace is operating on 1-pound or 14-pound pressure.

Other variations are not greater than found in the curves for 10 furnaces, an average curve for which is shown in Fig. 6.

The fact that there is no variation in the extent of penetration of the combustion zone with the amount and pressure of air blown (Figs. 3, 4, and 5) might have been foretold from the results obtained by Kreisinger* and others. In their combustibility furnace (Fig. 7) 1½ by 1-inch Pittsburgh coal, anthracite, and metallurgical coke were burned. A gas survey of the fuel-bed was made at rates varying from approximately 20 to 205 cubic feet of air per minute per square foot of grate surface. Results of tests for a metallurgical coke are shown in Fig. 8, where the rate was varied from 25 to 136 cubic feet of air per minute per square foot of grate surface.

The curves shown are quite similar. Oxygen has disappeared at a point 6 inches from the grate. The carbon dioxide is at a maximum at 4½ inches. Change in the rate of driving has made little difference in the reactions taking place in the zone of combustion.

Summary and Conclusions.

It has been shown that the extent of penetration of the combustion zone at the tuyere level of the blast-furnace is a constant, not dependent upon the amount of air blown.

*Kreisinger, Henry, Ovitz, F. K., and Augustine, C. E., Combustion in the fuel bed of hand-fired furnaces: Bureau of Mines Tech. Paper 137, 1916, 76 pp.

100 Per Cent Safety Marks Anniversary

A 100 per cent record for industrial safety was achieved in April by the Universal Portland Cement Company, according to a report recently made public. All its mills, located in various sections of the country, operated during April without having a single employe lose any time on account of accidents.

"With thousands of workers employed, manufacturing over 5,000,000 sacks of cement last month and with operations speeded up to meet the heavy demands of spring construction without the occurrence of any accident, is a gratifying result of years of safety education," declared B. F. Affleck, president of the company.

"Cement manufacture, in common with many other industries, is a hazardous occupation unless constant care is exercised by both company and employes. Think, for example, of the intense heat in the rotary kilns, rising to a temperature of almost 3,000 degrees, or more than hot enough to melt steel, and of the possibilities of accident in connection with them; or of the complicated electrical equipment which carries danger to the careless worker; or of the powerful crushers and rollers that crunch big chunks of rock and grind them to a powder fine enough to go through a sieve that will hold water.

"Yet, despite these hazards and despite the fact that employes include many nationalities and languages, making group instruction difficult, the use of modern industrial safeguards to protect the health and life of workers and the constant safety education that has been conducted for 25 years, have resulted in the 100 per cent perfect record established last month.

"The month of May marks the twenty-fifth anniversary of the organization of the Universal Portland Cement Company," concluded Mr. Affleck. "We believe there is no feature of this 'birthday' observance more gratifying than the ability publicly to announce this 100 per cent record of safety in industry."

Dr. Siegfried G. Werner, who came to this country in 1923 in the interests of the Schuermann side-blast cupola, has returned to Germany after a recent visit in Cleveland and Chicago. Dr. Werner is proprietor of a number of large foundries in the Ruhr Valley and elsewhere in Germany. For several years he was president of the German Steel Foundries Association and also the German Iron Foundries Association.

The Homestead Valve Manufacturing Company announce the appointment of the McArdle & Walsh Company, Key Highway at Boyle Street, Baltimore, Md. This company will have the distribution of Homestead products in the cities of Baltimore, Washington and surrounding territory.

A new Link-Belt book descriptive of "clean water" intake screens has just been published. The forepart of the book is given over to a brief description of the general construction of the Link-Belt screens, and follows with more than 30 elaborate views of various installations. Copies of this book No. 752 will be mailed free upon request to Link-Belt Company, Indianapolis, Chicago or Philadelphia.

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Book Review

By M. M. von Bernewitz*

"The Metallurgy of Aluminum and Aluminum Alloys." By R. J. Anderson. 913 pages and 295 illustrations. Henry Carey Baird & Co., New York, April, 1925. Price $10.

When one speaks of metallurgy he usually means the production of raw materials from ores, while the manufacture of these raw materials into finished articles belongs to other arts. But as this new book covers both the metallurgy and manufacture of aluminum and aluminum alloys (we use the common spelling although the author has used "aluminium" throughout) we think the title too modest. This work covers aluminum and its alloys from the bauxite ore deposit to the making of finished articles, and is the only complete book on the subject since Richards' last edition in 1896, now out of print. Thus, while many articles, papers, and some textbooks have appeared dealing with certain phases of aluminum, none have covered the whole field like this present treatise.

The iron and steel man will find "Metallurgy of Aluminum and Aluminum Alloys" worth perusal. Aluminum finds wide employment as a deoxidizing and solidifying agent in the production of steel ingots and castings; it has been employed somewhat in cast-iron foundry practice; and it is added to galvanizing pots for the purpose of cleaning the bath and giving better adherence of the zinc to iron and steel articles. When added to molten steel (1 to 8 ounces of Al per ton of steel) any iron oxide present is reduced to iron; the flow of metal from the ladle is facilitated; evolution of gas is stopped; and sound ingots free from blowholes are produced. The addition of aluminum, however, increases the pipe, which is one of the chief objections to its use. The metal must not be used in excess in steel, otherwise dirty or spotty steel may result. Aluminum is generally tossed into the ladle when the steel is tapped from a furnace or converter, and if properly added it is done so in fixed quantities.

A brief resume of the contents of this book may be of interest: There are 19 chapters and at the end of each is a bibliography of the literature on the subject discussed therein. The author index comprises 588 names, which have from 1 to 130 references apiece. Many of the 115 tables are of interest, and doubtless the statistics of production, consumption and prices will be found interesting and new to many readers. The same may be said of the curves, photomicrographs and photographs of plant operations and finished materials. The chapters cover the following subjects: The aluminum industry; mining and preparation of the ores; reduction processes for aluminum; properties of the metal and its alloys; preparation of alloys; melting practice; secondary metal and alloys; foundry practice (there are 2,500 plants in America casting aluminum or its alloys); casting losses; die castings and permanent mold castings; rolling and other mechanical treatment of the metal and allows; aluminum-alloy systems; micrography and macrography; heat treatment; soldering and welding; and drawing and other fabricating operations of the metal and its alloys.

From the above it will be realized that this book is both a practical and theoretical exposition of aluminum and aluminum alloys, and the student, metallurgist, foundryman, machinist, automotive engineer, and mechanical engineer will all find much instruction therein. As to the author, he is well known as a specialist in aluminum, both in the laboratory and in the works, and has written more than a hundred technical papers as the result of his experience, which has culminated in this latest addition to technical literature.

*U. S. Bureau of Mines, Pittsburgh, Pa.

Foreign Digest

In the Mitteilungen Vers. Dort. Union for 1924 there is an article by S. Reiner and W. Feldmann on the Reduction of Iron Ores by Gases. They conclude that a complete reduction is very difficult to obtain. Their tests confirmed Osann's theory of slag formation and his conclusion as to the influence of the nature of the gangue material and ferrous oxide content.

It is altogether likely that for certain purposes electrolytic iron will find distinct fields of usefulness and it is of interest to follow the development of the technology of electrolytic iron. Emil Duhme in the Scientific Publications of the Siemens Company (Germany) describes the preparation of very pure iron. Using an anode containing 3.2 per cent carbon and 1.1 per cent silicon electrolysis was conducted with simultaneous magnetic purification of the electrolyte and a smooth deposit of electrolytic iron was obtained containing only 0.002 per cent carbon and 0.001 per cent silicon. By the use of a superimposed auxiliary a.c. (in addition to the direct current necessary for depositing the iron) he obtained an almost phosphorus-free electrolytic iron from a high phosphorus anode

The Metallurgical Section of the Chemical Age (London) returns to the old controversy about sulphur in steel and states in substance that a very considerable and well established body of evidence has accumulated during the past 20 years or so to the effect that the presence of small amounts of sulphur in steel is nothing like as baneful as it is popularly supposed to be The myth arose as the result of faulty reasoning in the days when cause and effect were not properly understood and certain vested interests, namely manufacturers with access to such pure materials as to be able to produce low-sulphur products, have combined to maintain the existence of this myth. Enough manganese to form the manganous sulfide or even the double manganous-ferrous sulfide prevents all harm from much above the present sulphur tolerances. A proper understanding of this situation will prevent the rejection of low cost cokes somewhat high in sulphur, or ores or other products suffering from a similar disadvantage which nevertheless can produce a satisfactory steel.

Mr. V. C. Faulkner, vice-president of the Institute of British Foundrymen delivered an address on refractories in which certain important points were brought out. Bricks should conform closely to standard dimensions as variations meant the use of large quantities of cement which was never as good as the brick itself. Of all bricks examined magnesite bricks ran truest to shape. He brought out the necessity for the physical laboratory testing of bricks for heat conductivity and thermal expansion. He advised glazing as desirable to produce the minimum exposed surface and recommended that the glazing cement be applied in successive thin layers for the best results.

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The Dawn of A New Era

An Employe's Reaction to Results Apparent When Management Realizes Its Possibilities

By D. J. KELLEY*

AT the plant of the Dominion Iron & Steel Company, Ltd., which is one of the constituent companies of the British Empire Steel Corporation, Ltd., during the past year a new order of things has come to pass. After the many vicissitudes this plant has passed through during its 25 years of existence, a new era is dawning and the breaking of old records conjointly with the establishment of new records greatly surpassing anything heretofore accomplished at these works, has become the order of the day. Records and more records, in quantity production, quality and cost, constitute the new slogan, and most everybody at the works is doing it.

To cite the more outstanding accomplishments of recent origin, the following should be mentioned:

No. 1 blast furnace, which is of modern type, broke all previous daily, weekly and monthly records during the month of April, 1925, the best previous results having been obtained during March, 1924. The tabulation below gives a comparison for the two months referred to:

PIG IRON PRODUCTION—No. 1 BLAST FURNACE

	Best Previous Production March, 1924 Operating 31 Days	Production During April, 1925 Operating 30 Days	Increase
Avg. per day...	425 gross tons	450 gross tons	25 tons
Best per day...	514 gross tons	522 gross tons	8 tons
Best week	3,106 gross tons	3,233 gross tons	127 tons
For month	13,192 gross tons	13,496 gross tons	304 tons

These records were produced in the face of such abnormal handicaps as working with coke produced from coal that had been banked for close to six months (due to coal miners' dispute) and, generally speaking, the grade of iron ore available from Wabana Mines, Newfield, while fairly high in iron content, imposes a hardship in comparison with the average practice in Upper Canada and the United States, in that the silica content is much above the average encountered there. This necessitates a heavier lime charge and brings about also a higher coke consumption per ton of pig iron produced, although it should be stated here that by careful supervision and improved practice the coke rate is steadily declining and now compares very favorably with the best practice across the line.

The splendid records achieved in the blast furnace department in April, 1925, and in the open hearth steel department in March, 1925, were equally maintained in the rolling mills during the month of April.

Leading off with the blooming mill, where the steel ingots are rolled down to rough sections, we find that this mill broke all previous records with an average hourly production taken over the whole month by some 16.5 per cent. Numerous factors may be attributed to this, but the larger engine for driving the mill, which was recently installed, is perhaps one of the main reasons.

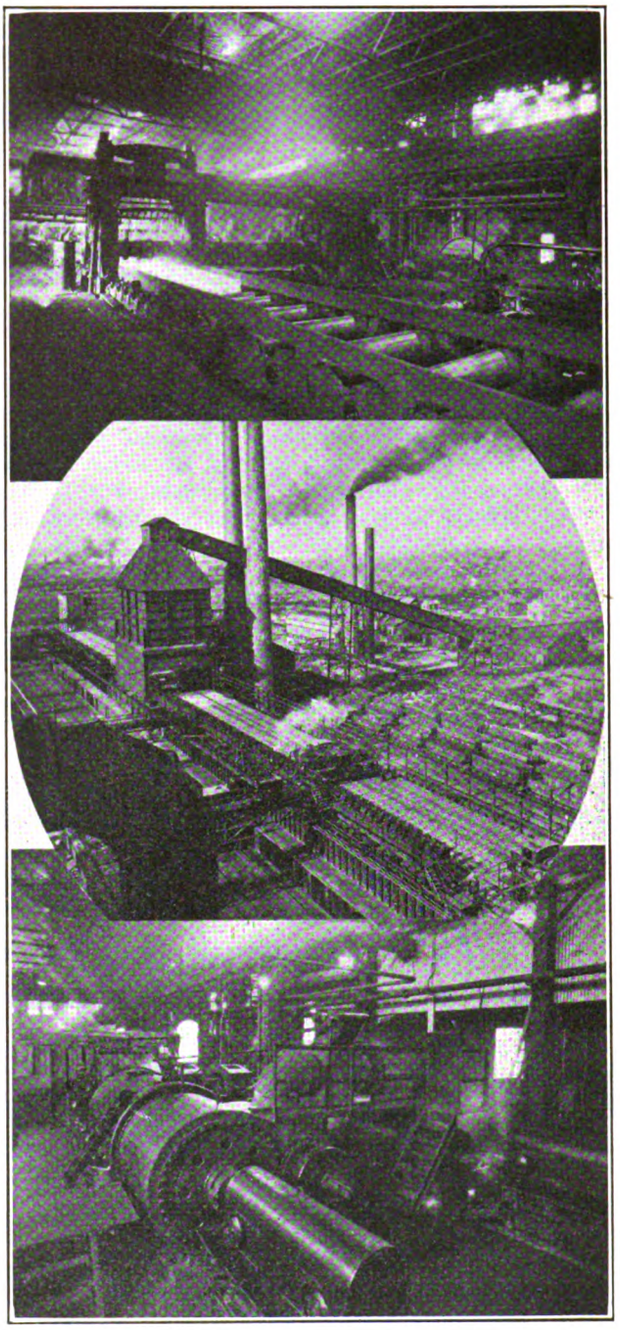


FIG. 1.—*A view of the 35-in. blooming mill in operation, showing ingot on roll train. Middle—bird's-eye view of the by-product coke plant. Lower—the blooming mill engine recently installed.*

It is in the rail mill, however, in which we produce the largest tonnage of finished product, that the pre-

*General Manager of Steel Plants, British Empire Steel Company, Sidney, Nova Scotia.

Generated on 2024-09-07 22:16 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

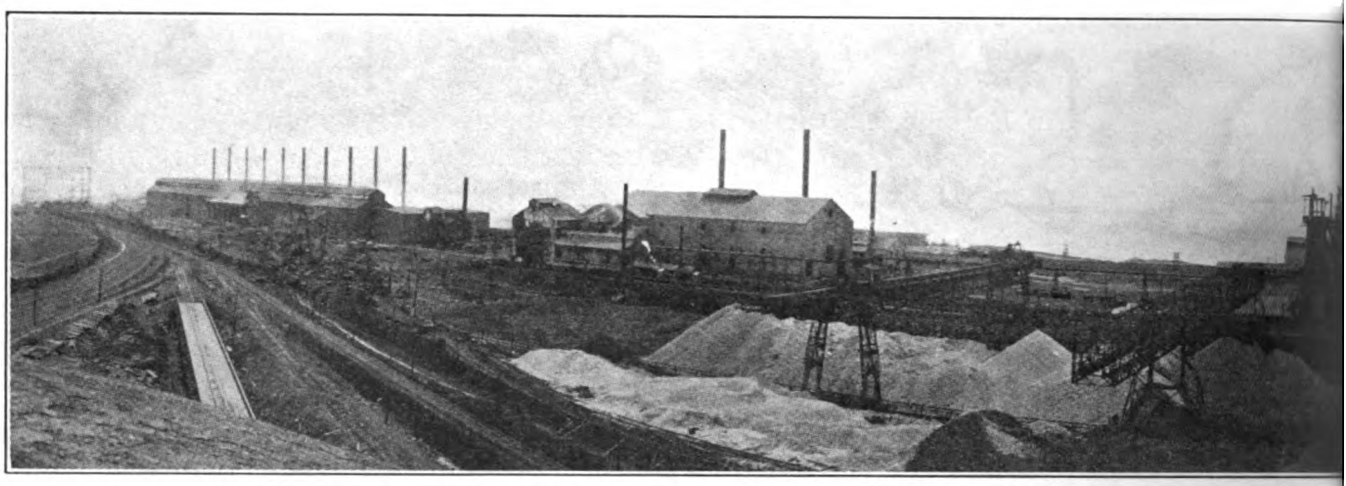


FIG. 2.—*Panorama of British Empire Steel Company's Sidney, Nova Scotia, Works, show*

vious claims made for increased efficiency are fully justified. The rails are made under a very severe specification and the method of manufacture, chemical and physical properties, the shape of the section, the finish and mechanical requirements are all under a rigid inspection on behalf of the purchaser by R. W. Hunt & Company. It might be mentioned in passing that the specifications under which rails are made in Canada for Canadian railways are more strict than any others on this continent, and in some respects more severe than European specifications. This refers to such items as drop testing all rails produced from three ingots of every 50-ton heat, a nick and break test for one rail of every ingot, weight, height of fall and deflection of the drop test proper, etc.

With this in mind it is a very remarkable achievement that the average hourly production in the rail mill, taken over the whole month of April, mostly on 85-lb. rails, was 34.5 per cent better than any previous month since the rail mill has been in operation. Capping this unusual increase in rate of production, we find that the quality of product has not suffered in the least, as the total saleable rails rolled for the month is 99.3 per cent of all rails rolled. Of all rails rolled during the month, 95.4 per cent were firsts, and the percentage of rails showing mechanical and physical defects was 3.9 per cent, the non-saleable rails being 0.7 per cent.

All things considered, it is indeed very commendable that such increase in production should go hand in hand with such a high standard of quality and is but another indication of the earnest efforts that are being put forward on every hand by all of the employes to attain and maintain standards of industry

Eastern States Blast Furnace and Coke Oven Association Meet in Youngstown

Official Announcement Promises Interesting Program— "Uniform Quality" Investigation Continues

THE annual meeting and election of officers of the Eastern States Blast Furnace and Coke Oven Association, will be held at the Youngstown Country Club, Thursday, June 4.

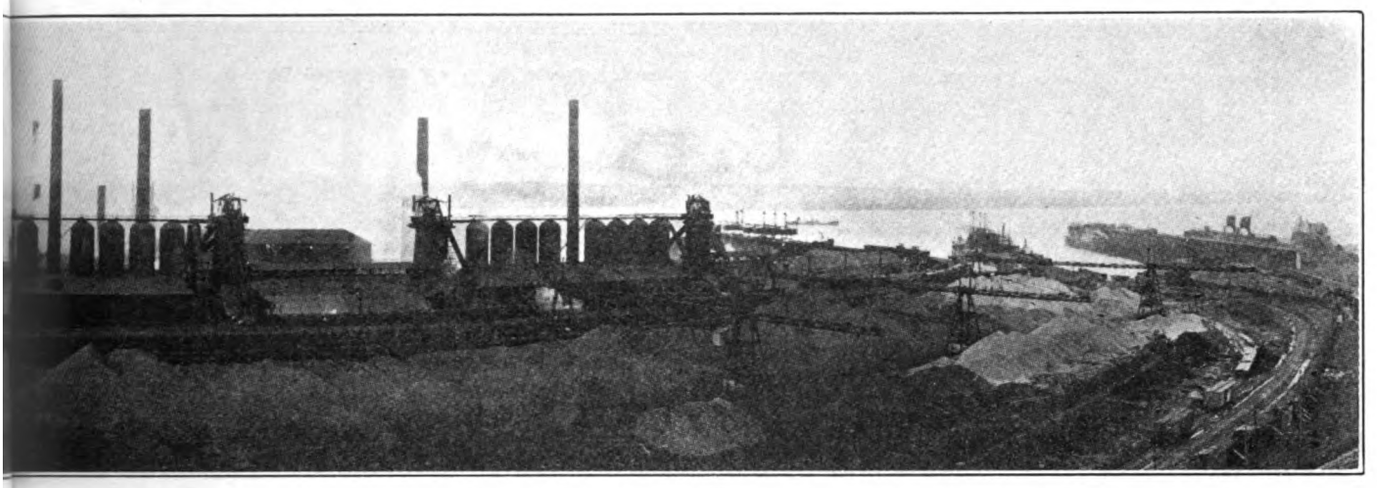
The technical session, which follows the formal dinner at 6:30 in the evening, will present Mr. F. W. Sperr Jr.'s paper on "The Purification of Coke Oven Gas," with special reference to the preparation of gas for open-hearth furnaces. Mr. Sperr is Chief Chemist of the Koppers Company, and this paper promises to be a valuable contribution to the technical knowledge of coke-oven operation and regulation.

The Committee on Arrangements, Messrs. Braman, Reilly, Williams, Fraser and Haven, announce that an information bureau will be maintained in the lobby of the Ohio Hotel, where arrangements can be made for visits to the following plants in the Youngstown district: Republic Iron & Steel Co., Youngstown Steel & Tube Co., Sharon Steel Hoop Co., Carnegie Steel Co. (Ohio Works), Wm. B. Pollock Co., Trumbull Cliffs Furnace Co., Trumbull Steel Co.

A special train returns to Pittsburgh, via the P. & L. E., after the meeting.

When the character of the work which this young and vigorous organization has done and is doing is considered, it is not too much to expect further gains from each quarterly meeting. They have never hesitated to frankly state the problems of their industry, and have awlays called in leaders to visualize the results of their research. Blast furnace records have been both a result and a stimulus.

Generated on 2024-09-07 22:17 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



om right to left—the piers, blast furnaces, open-hearth and raw material stock piles.

and quality which may be rightly and proudly claimed to be unsurpassed anywhere.

While the above are the outstanding records for the past month, other records equally encouraging were recently piled up in several other departments of the plant and at other subsidiaries of the corporation, and practically all of these records were produced under metallurgical difficulties not encountered in most American steel plants.

Now it may be asked what is the significance of it all, what do these new records portend? Expressed in a formula it is this: Given a perpetuation of the highly efficient management of the present regime, the splendid co-operative and loyal spirit of the present department heads and their understudies, given also a continuation of the excellent spirit now prevailing among the employes and, finally, reasonably stable commercial conditions, this important industry of Nova Scotia may yet receive an impetus which will quicken the life of the communities dependent upon it and thus bring about a better state of affairs than has existed in years gone by.

Encouraged by the superior performance statistics referred to above, it can be stated that the future, though formidable in its problems, is glowing in the promise of still greater achievements that will doubtless be rendered by the crews and captains of the various steel plant departments inspired by the leadership, human sympathy, heart appeal to confidence, respect, enthusiasm, hope and loyalty of an efficient management.

These are accomplishments that no hostile press or other sinister influence can either minimize or eradicate.

American Iron and Steel Institute Holds 27th Annual Meeting at New York

A Notable List of Speakers Present Varying Viewpoints— Technical Discussions Cover a Very Wide Range

MORE than the usual thousand members and guests enjoyed Judge Gary's dinner at the Commodore Hotel, May 22.

Following Sir Esme Howard, the British Ambassador's remarks, the chairman proceeded in his discussion of "Diseases of Industry". Taxes, both direct and indirect, have become a terribly heavy burden; the high cost of living has upset natural equilibrium; but the most acute symptom is the abnormal, unnecessary, timid and ill-poised mental attitude of managers themselves. With hope and belief, determination and energy, the skies will clear.

The chairman expressed his confirmed optimism in the economic future of the United States, basing his promises on outstanding natural resources, emphasized today by seasonal crop outlook, which is reported above the average. Conditions in foreign countries, financial, commercial and political, are surely improving; this improvement must favorably affect the industries of America, including the iron and steel industry.

The technical papers presented were of the usual high quality. Wm. J. Corbett, of the Electric Steel Founder's Research, discussed Factors in Steel Foundry Business; L. H. Miller, of the American Institute of Steel Construction, reviewed the developments evident in the structural industry; H. D. Savage, vice president, Combustion Engineering Company, emphasized the importance of better furnace wall design and construction ;W. H. Bailey, Illinois Steel Company, traced the developments toward larger blooming mills and C. O. Hadley, Alan Wood Iron & Steel Company, offered a basis for revised billet classification.

Generated on 2024-09-07 22:17 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

CURRENT REVIEW

Flexibility Necessary in American Can Plant

In the Maywood plant of the American Can Company, gas is used exclusively for all heat processes, with the exception of firing the boilers.

The plant formerly operated on producer gas, manufactured at their own gas plant, representing an investment of several hundred thousand dollars. This producer gas plant has been dismantled and the Public Service Company of Northern Illinois, as described in the Public Service News, is supplying the entire gas load through a 6,000-ft. low pressure main extension of 16-in. cast iron main.

The gas is measured through a low pressure Connersville rotary meter with a maximum capacity of 60,000 cu. ft. per hour. The gas is sold under a maximum demand schedule, and the meter equipped with a graphic maximum demand recorder.

The annual consumption at this plant will probably average around 80,000,000 cu. ft., which is equivalent to the domestic gas load in a town of 15,000 population.

After being metered at low pressure, the gas is boosted and distributed throughout the plant at 3-lb. pressure. Sub-meters are installed to distribute fuel costs over the different plant divisions served.

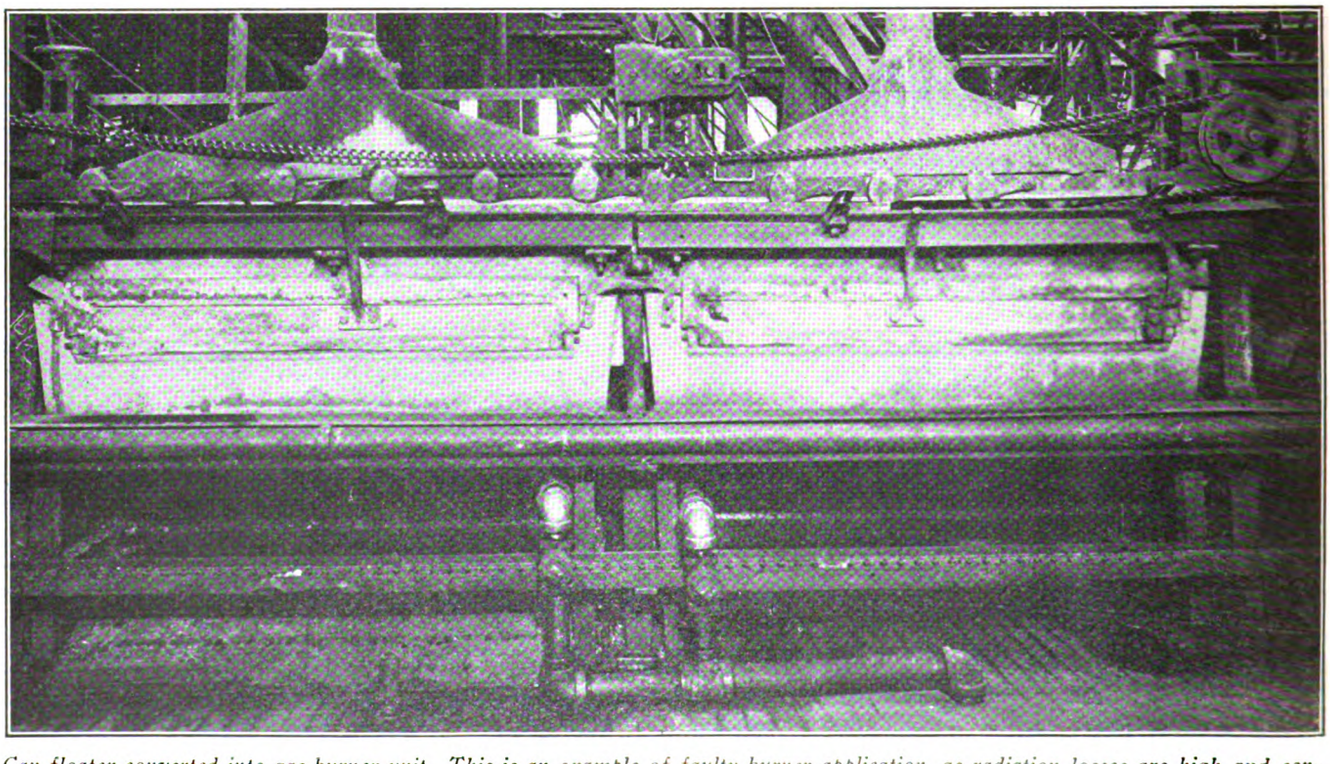
The American Can Company produces a wide variety of metal containers for the packing industries These containers, necessarily low in price, must be produced in large quantities. Quantity production permits of special automatic machinery, with special heat application problems.

The Public Service Company has been instrumental in the development of miniature high pressure gas burner equipment, designed to meet the requirements of the can industry. These burners combine practically unlimited "turn down" qualities, with correct combustion and maximum efficiency; a combination difficult to obtain in a miniature burner operated on ordinary high pressure gas. The American Can Company's Maywood plant is equipped throughout with this type of burner equipment.

The principal heat processes employed in the manufacture of cans may be roughly classified as soldering or drying. Automatic machines capable of turning out from 10,000 to 15,000 completed cans per operating hour unit form the can, solder the side seam, flange the ends, crimp in the bottoms, automatically test for leaks and deliver the cans to a conveyor running to the shipping department. Gas is used for soldering purposes.

Paper labels formerly pasted on food product cans are largely superseded by labels lithographed directly upon the can during the process of manufacturing it.

Blank tinned sheets are printed in a press similar to a standard press, using lithograph ink instead of



Can floater converted into gas burner unit. This is an example of faulty burner application, as radiation losses are high and control of the secondary air for combustion is impossible.

Generated on 2024-09-07 22:16 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

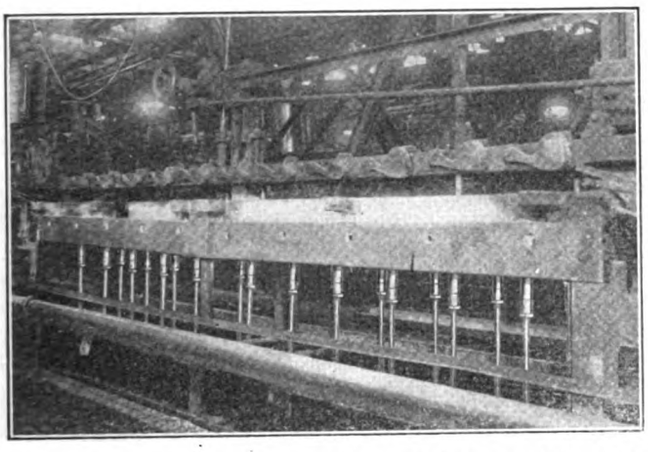
printers' inks. These sheets are then conveyed through long drying ovens which dry or bake the ink on the metal. One color is printed and baked per operation. Additional colors call for successive operations of printing and baking.

In order to produce accurate results, a definite heat cycle must be maintained throughout the oven. Due to its flexibility gas fuel solves the problem with an absence of soot and smoke prevalent with other direct fired fuels. Continuous operations can be duplicated with minimum of supervision. These lithographed sheets are then sheared, and the can blanks are fed to a can machine which delivers the finished product to the shipping department.

Lithographed labels are more durable than paper labels and permit of processing or cooking food products directly in the container without injury to the label. A view of the labels being produced at Maywood represents many of the familiar advertising trademarks and also many printed in foreign languages.

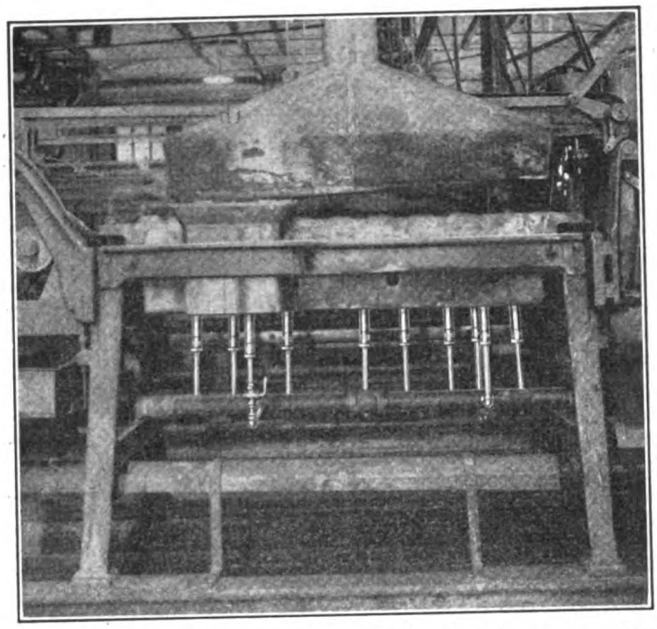
Certain food products contain acids which attack the metal of the container, causing a taint to the content. Such containers are coated with a special varnish which is baked on the side of the plate forming the inside of the container. This lacquer coat presents a surface impervious to acid action.

Very accurate temperature control is essential for uniformity of product. Thermostatic control and correct mixture of gas and air obtained with proper burner design, eliminates the human element in operation. When the machine operator is relieved of the responsibilities attendant upon manual control of temperatures, he can concentrate his entire effort on production.



Can floater converted into an efficient gas burner unit by proper design and application.

The production of metal containers was formerly confined to the packing of vegetables and fruits. This presented a problem of seasonal production dependent upon the normal canning seasons. Many more food products are now marketed in metal containers. This permits of constant production of cans throughout the year. The peak production period still occurs during the summer months, but production during winter months has grown steadily until it represents probably 50 per cent of the maximum summer production.



Rear view of can body forming machine, showing arrangement of individual burners.

Uniformity of product is dependent upon correct heat application and control. Through experience, the can industry has learned the value of gas.—Industrial Gas for May.

Impromptu Remarks of Elbert H. Gary*

I think I shall tell you something at this time about our management.

In the first place we have a board of directors, fifteen when the number is filled. These directors are selected with reference to their qualifications, their experience, their learning, their natural intelligence and their reputation for the strictest honesty. These directors meet once a month. They of course have the control of the affairs of this great corporation. They are over all.

Then we have the Finance Committee, selected from the board of directors, numbering seven. On the finance committee are George F. Baker, J. Pierpont Morgan, Richard Lindabury of New Jersey, Percival Roberts of Philadelphia, Mr. Farrell, our President; Mr. Filbert, our comptroller, and myself. Omitting my own name just for the moment, I think all in all the members of this finance committee are as able as any committee or any board that ever managed the affairs of a great business concern. These men are not only able, they are working men. By that I mean the committee meets every week; sometimes on special occasions when necessary there are two or three meetings in one week. The committee keeps in touch with the business affairs of the corporation. They know what is going on; they are not like committees and boards used to be, I will say, in some corporations, taking for granted anything that might be said or recommended by an officer, but they know for themselves what the condition of the company is, what its necessities are, what must be done to protect the corporation in every respect, whatever may happen;

*Chairman, United States Steel Corporation, at annual meeting, April 20, 1925.

Generated on 2024-09-07 22:14 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

and they attempt to be fully prepared for all the emergencies that may arise in the conduct of a great business. Not only that, they are very largely interested in the securities of this corporation; they are stockholders, just the same as you who are here today; they are exactly on a level with you; their interests are precisely the same as yours. Some of our directors are the largest stockholders in the corporation. Many of us own considerable that is in other names for convenience.

And then our principal officers in the corporation and in our subsidiary companies are men of similar experience and standing; and some of the latter have been presidents of the subsidiary companies respectively from the beginning, from the time of the organization of the corporation; and they, many of them if not all of them, are large stockholders. And not one of these officers would intentionally do a wrong to the corporation or to a stockholder in this corporation, any sooner than you honest men would go into your own home, your own household, and purposely bring an injury upon a member of your family.

I might say to the public, if I were talking to the public—which I am not—that we give to the public (because we have to do it if we properly serve our own stockholders) all the facts and figures, from month to month and year to year, so that they shall have full opportunity to study and if necessary to inquire of us in regard to any of the details; that is, any of the details that are proper to be known at the time, and therefore could possibly have no reason to complain. I say proper to be known at the time; and, lest I should be misunderstood, I may say I mean by that expression that it is obvious to the intelligent man that during the course of procedure, during the pendency of any business transaction, it would be impossible to expose at the time exactly what we are doing and what we are intending to do in the future, without running the risk of materially interfering with the success of the business that may be involved.

In that connection please remember that there are something like 60,000 of our employees who are stockholders in our corporation. During the war and at other times our employes have never failed to furnish the steel that was necessary in the public interests. At the time when it was uncertain whether or not our associates in Europe, and even including our own country, might or might not be overwhelmed by the enemy, all the steel that could possibly be produced by our concern was demanded by the governmental authorities, and we kept our mills running night and day, every day in the week, to full capacity, because our employes were faithful, industrious and patriotic.

There are many in this room who have seen one corporation after another, railroads and other concerns, who have gone into the hands of a receiver, who have been obliged to borrow money from time to time, and who have finally come to the point where credit was not good, and they had to turn their properties and their business over to the courts for reorganization and refinancing, very much to the prejudice and sometimes the total loss of the interest of some of the stockholders.

I do not think the United States Steel Corporation will ever get into that position while its management is the same as it is at the present time. There have been times, not recently, when there was some disagreement between the members of our large board of directors, consisting at the start of twenty-four as I remember; some believed we could pay out more dividends, that we could manager our concern with a little more liberality towards the stockholders; but others have stood from the beginning unblushingly and determinedly with a view of protecting our corporation against distress, whatever might happen; and they have had their way.

I have made up a few figures:

We have undivided surplus on hand	$517,061,308.00
From this amount there has been invested in capital, that is, new properties necessary to be built and established if we are to take care of our business and keep our position in the trade, not only in this country but in all other countries	264,070,646.00
Leaving a balance of net working assets	$252,990,662.00
This large sum is found in the following accounts:	
Inventories	$213,189,316.00
Receivables	29,362,252.00
Securities	36,506,508.00
Cash	79,197,290.00
Making a total of	$358,255,366.00
Less current and contingent liabilities	105,264,704.00
Leaving the net as above stated	$252,990,662.00

Then some of you will say, perhaps, that we have a large sum in that contingent account. What are we going to do with that? If I knew exactly what we were going to do or knew what we need not do I would tell you. There are a good many things that we have to provide against, a good many things which for lack of knowledge we cannot tell about in advance; but if we did not provide for them and it turned out that we were wrong in guessing, we might have to pay when we did not have the money to pay with; and then where would we be? For instance, you read in the newspapers awhile ago that the Government was claiming we owed it $64,000,000 taxes that we should have paid. I want to say first with reference to that, not by way of defense, but as a statement of a fact, that the Government did not discover anything that had been hidden from it, they did not find we had neglected to expose the facts and figures with respect to our business; but we believed there might be an honest difference of opinion in regard to our liability, just as now has turned out to be the case; and we provided for the worst if a decision should be made against us. In other words, we have kept on the safe side all the time, everywhere, holding our money when we do not think we owe it, even against the Government of the United States; if law and justice entitles us to the money we feel justified in keeping it, telling the Government we have kept that money and we propose to keep it until a fair adjudication determines otherwise.

—U. S. Steel Company Annual Report.

Generated on 2024-09-07 22:18 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

National Pressed Metal Society Formed

Technical Society Recently Organized to Be Devoted Exclusively to the Discussion of Pressed Metal Problems—First Meeting Brings Out Enthusiastic Attendance

THE need for a pressed metal technical society as outlined in the January issue of Forging-Stamping-Heat Treating was emphasized at a meeting held in Chicago, Saturday, April 11th, at which time the National Pressed Metal Society was organized.

Much had been said in the past concerning the necessity for such a society, but no action had been taken to effect an organization. At an informal meeting held in Chicago early in March, the advisability of forming a society to promote the arts and sciences connected with the pressing of metals, and the study of subjects relating to the manufacture and use of pressed metal parts, equipment and supplies was discussed from many angles, and it was the unanimous opinion of those present that steps should be taken that would lead to the formation of the society. A meeting of those instrumental in founding the society was held Saturday afternoon preceding the technical session at which time a constitution was adopted and officers elected.

JOHN C. BIEMECK
President

One of the main purposes of the society is to provide a satisfactory means for contact between the representatives from all the companies that manufacture and use pressed metal products in order that their various technical problems may be thoroughly considered.

It is generally conceded that there is a real need for an organization of this kind and it is, therefore, pleasing to learn there is every indication that the society will receive the whole-hearted support of those interested in the various branches of the pressed metal industry. Endorsement of the undertaking has been given by a large number of men in the field. This interest has been manifested by applications for membership from a considerable number of industrial executives. The membership dues are nominal, inasmuch as it will be necessary to provide only for the actual operating expenses of the society.

The activities of the society will be confined to the Chicago district at present, but chapters will be established in the large manufacturing districts where the membership is sufficiently large to warrant this action. Applications have already been received from all parts of the country, which is conclusive evidence that the formation of the society has been favorably received. The fact that the society's work will be devoted exclusively to the various problems connected with pressing of metal is responsible for the keen interest it has attracted.

D. L. MATHIAS
Secretary-Treasurer

Mr. F. J. Rode, Mechanical Engineer, Marquette Tool & Manufacturing Company, Chicago, presented an interesting paper entitled, "Selecting Pressed Metal Equipment."

The customary practice in determining the equipment required for the production of pressed metal parts is to first plan the operations and tools and then select the machines, such as shears, blanking press, forming press, draw press, etc., whatever the case may be. It is usually advisable to consider productive time on pressed metal equipment not to exceed 2,000 hours over a period of one year when working nine hours a day, and double that amount if running a night shift of ten hours.

GEORGE E. WATTMAN
Vice President

If given careful consideration the type and number of machines required for any particular job can easily be determined and good results obtained. Frequently, however, not much attention is given to the type of machines required for the various operations with the result that the actual depreciation charge made against the parts that are to be made on the equipment is not correct. An illustration to substantiate this statement was taken from two plants that were producing the same stamping for the same customer.

One was using a shear and knuckle joint press, the other an open side crank press. The material produced was of heavy gauge and required considerable pressure. Both concerns employed two men to perform the operation of blanking. The shear and knuckle joint press, costing a total of $10,000, produced 10,000 blanks per day, while the open side blanking press cost $20,000 and produced 5,000 blanks per day.

In selecting pressed metal equipment it is advisable to use a depreciation charge of approximately $0.60 per hour for every $10,000 worth of equipment purchased, not including tools.

The officers for the coming year are: President, John C. Biemick, Coonley Mfg. Co., Chicago; vice-president, George E. Wattman, Adams & Westlake Co., Chicago; sec.-treas., D. L. Mathias, The Andresen Co., Pittsburgh. Headquarters at Chicago, offices at Box 65, Pittsburgh, Pa.

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Current Literature on Ferrous Metallurgy

By E. H. McCLELLAND*

Abmessungen und leistungen deutscher Siemens-Martin-oefen. Hugo Bansen. *Stahl u. Eisen,* v. 45, Apr. 2, 1925, p. 490-507.

Apply test methods to aid in controlling sands in foundries. H. W. Dietert. *Foundry,* v. 53, May 1, 1925, p. 361-366.

Basic principles underlying the manufacture of semi-steel. *Foundry Trade J.,* v. 31, Apr. 9, 1925, p. 306-308.

Beiträge zur frage der granulation und trocknung von hochofenschlacke. *Stahl u. Eisen,* v. 45, Apr. 9, 1925, p. 529-536.

Describes processes at several German works.

Better foundry pattern storage advocated. *Iron and Steel of Canada,* v. 8, Apr. 1925, p. 79-81.

Study by Policyholders' Service Bureau of Metropolitan Life Insurance Company.

Carbon control gages strength. James Ward. *Iron Trade,* v. 76, Apr. 9, 1925, p. 944-945.

Castings for Diesel engines. *Foundry Trade J.,* v. 31, Apr. 16-23, 1925, p. 321-325, 347-349.

Castings for machine tools. H. Jowett. *Foundry Trade J.,* v. 31, Apr. 23, 1925, p. 341-344.

Serial.

Chain-driven cold rolls. *Iron and Coal Trades Rev.,* v. 110, Apr. 10, 1925, p. 580.

Commercial quality bar steel defined. *Iron Age,* v. 115, Apr. 30, 1925, p. 1282.

Specifications of Association of American Steel Manufacturers, for commercial and special forging quality bar steel.

Comparative tests made on steel works furnaces. *Fuels and Furnaces,* v. 3, May 1925, p. 513-514.

Tests of powdered coal and semi-gas firing by "Heat Economy Bureau of German Iron and Steel Institute."

Correct malleable casting patterns. Harold A. Russell. *Iron Age,* v. 115, May 7, 1925, p. 1331-1334.

Designing the pickling department for economy in maintenance. C. A. Crawford. *Iron Trade,* v. 76, Apr. 9-16, 1925, p. 935-937, 1003-1006.

Continued from Apr. 2.

"Dirty steel" under the microscope; precautions necessary in preparing and judging specimens; rusting, pitting and scratches may mislead. George F. Comstock. *Iron Age,* v. 115, Apr. 23, 1925, p. 1185-1188, 1244.

Eisen-kohlenstoff-diagramm und die wichtigsten gefügebestandteile der kohlenstoffstähle. Karl Daeves. *Stahl u. Eisen,* v. 45, Mar. 19, 1925, p. 427-434.

Ford installs new type of baking ovens; new ovens for baking the finish on open cars incorporate many special features. Elmer C. Cook. *Fuels and Furnaces,* v. 3, May, 1925, p. 497-502, 519.

Formation of graphite in cast iron. J. E. Hurst. *Foundry Trade J.,* v. 31, Apr. 16, 1925, p. 326-330.

Future development of the shape of the blast furnace. A. Korevaar. *Iron and Coal Trades Rev.,* v. 110, Apr. 10, 1925, p. 577-579.

Improvement of cast iron by alloy additions. E. Piwowarsky. *Foundry Trade J.,* v. 31, Apr. 16-23, 1925, p 331-334, 345-346.

Large uses of steel in small ways; bookbinder wire. *Iron Trade,* v. 76, Apr. 30, 1925, p. 1123.

Large uses of steel in small ways; steel vests. *Iron Trade,* v. 76, Apr. 16, 1925, p. 1007.

Electric heating for manufacturing processes assumes importance. C. L. Ipsen. *Iron Trade,* v. 76, Apr. 16, 1925, p. 1008-1010.

From A. I. E. E. paper.

Making hard manganese steel involves careful treatment. Hubert Hermanns and Hermann Meixner. *Foundry,* v. 53, Apr. 15-May 1, 1925, p. 323-325, 356-358.

Metallurgical research in England; experimental foundry and small rolling mill aid research at National Physical Laboratory; investigations in progress. Walter Rosenhain. *Iron Age,* v. 115, Apr. 16, 1925, p. 1129-1131.

New double drive for a reversing two-high rolling mill. *Iron and Coal Trades Rev.,* v. 110, Mar. 6, 1925, p. 385-386.

Note on the structural composition of cast iron. J. E. Fletcher. *Foundry Trade J.,* v. 31, Mar. 5, 1925, p. 196.

(To be Continued)

Technical Articles

"Foundries of Automobile Builder." Cadillac plant houses iron, aluminum and brass units together —Simplified supervision and reduced overhead expected.

"Combustibility of Blast Furnace Coke." Further experiments based on the composition of gases—Size of coke and rate of air supply—Beehive coke and charcoal.

"Welding vs. Riveting of Large Structures." Lower cost and better product claimed for the welding process—Experience shows welding to be safe—More data needed.

"Equipment and Methods in Die-Casting." Development in casting of metals in permanent dies under high air pressure—Comparison of die-castings with machined parts.

"Four Classes of Die-Casting Alloys." Bases of lead, tin, zinc and aluminum—Cost saving by reducing machining work—Inspection important.

"Characteristics of Indusrtial Floorings." Factors to be considered in selecting floor—Method of preventing decay—Adaptability to loads and machine weights.

"Dirty Steel Under the Microscope." Precaution necessary in preparing and judging specimens—Rusting, pitting and scratches may mislead.

"Metals from Fused Electrolytes." Electrochemists discuss new processes for making pure aluminum, magnesium and other metals—New way to galvanize wire.

"Correct Malleable Casting Patterns." Proper gating saves much in reducing loss of castings—Allowing for inevitable shrinkage.

"Methods of Welding Inspection." Practice of various industries in testing skill of operators reviewed at Welding Society's annual meeting.

—April and May issues of Iron Age.

*Technology Librarian, Carnegie Library of Pittsburgh.

Generated on 2024-09-07 22:17 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

SHEET AND TIN PLATE

*The Sheet Steel Industry**

A Statistical Analysis of Conditions Within the Industry

By W. S. HORNER†

DURING the year, the Sheet Steel Industry, with the assistance of the Department of Commerce, has adopted and is endeavoring to promote, a program of simplification and elimination of waste in industry, this consisting of the discontinuation of a great number of sizes of sheet steel, and certain gauges.

Many of the most inspiring passages in Mr. Horner's address have been deleted. As his summary of conditions was prepared especially for the occasion, and bore significance mainly for those present it seems appropriate to omit certain portions.

In recent years, business men are paying more attention than ever, to movements which make the process of production and distribution more direct and economical. This has resulted, first, from the rising production and distribution costs, and secondly, because there has been a tendency, until recent years, in both production and distribution, to extend processes and services without rhyme or reason, usually to meet the expressed or contemplated whims and dictates of individual purchasers. Thus, uneconomic and destructive practices have developed, and, in consequence, simplification and standardization have been undertaken.

War-time conservation in the elimination of styles and varieties under the direction of the War Industries Board, gave to simplification its real significance. In those years, many lines of American manufactured goods were simplified for the first time in the effort to conserve money, materials, and men, in the national emergency. That these movements were so essential to war conservation, would seem to argue that peacetime saving would also accrue. By way of example, it has been estimated that the automotive industry saved some $750,000,000 in 1920 alone through the adoption of dimension standards of the Society of Automotive Engineers. Most of this has of course been passed on to the public in car reductions.

The value of the program of simplification, as adopted by and applied to the sheet steel industry, in saving to producer and consumer, can hardly be overestimated. That it is very great, must be certain; and that it is needed today by the sheet steel manufacturers, there could be no doubt — for, have they not already anticipated a material saving, and without waiting for realization, passed it on to the public?

In this work, we have had the constant and most painstaking help of the Department of Commerce, working through Mr. A. E. Foote.

Every possible effort on the part of sheet steel manufacturers, jobbers and fabricators, should be made, with the view of promoting this program, and establishing it definitely throughout the industry.

THE SHEET STEEL INDUSTRY
For Year 1924

FIGURE PICTURE
Per Cent to Capacity

		Mechanical Operation	Production	Shipments	1924 Average	1923 Average	1922 Average
1.	A.	91.7	116.1	113.8	107.2	76.3	--
2.	B.	95.3	114.0	111.3	106.9	101.6	93.1
3.	C.	91.6	100.6	97.0	96.4	--	--
4.	D.	79.0	106.1	99.7	94.9	87.6	67.1
5.	E.	93.6	95.4	87.9	92.3	--	--
6.	F.	84.5	96.5	96.9	92.3	92.3	79.4
7.	G.	95.3	88.4	89.9	91.2	86.0	77.8
8.	H.	89.4	86.0	84.6	86.3	91.0	80.6
9.	I.	80.9	87.6	89.7	85.7	85.4	79.7
10.	J.	72.0	90.8	88.2	83.7	105.7	85.0
11.	K.	77.1	85.6	86.7	83.1	94.0	83.2
12.	L.	80.0	82.0	83.6	81.9	92.5	85.7
13.	M.	70.7	89.5	85.6	81.6	82.5	83.3
14.	N.	76.9	86.4	81.6	81.3	72.5	80.3
15.	O.	65.4	86.2	82.3	78.0	99.1	74.5
16.	P.	73.0	77.0	76.7	75.6	89.1	84.9
17.	Q.	88.6	64.4	65.6	72.8	65.9	82.5
18.	R.	66.1	75.1	76.4	72.5	80.4	79.9
19.	S.	68.9	68.8	69.9	69.2	94.2	72.3
20.	T.	74.1	67.0	61.9	67.6	83.9	75.1
21.	U.	64.8	67.8	69.4	67.3	77.5	78.9
22.	V.	62.6	71.1	68.0	67.2	64.2	59.5
23.	W.	60.1	69.9	70.2	66.7	69.2	44.9
24.	X.	66.9	62.6	65.1	64.9	66.3	82.3
25.	Y.	62.3	64.6	65.6	64.2	81.3	91.8
26.	Z.	58.9	65.0	62.2	62.0	76.4	63.3
27.	AA.	70.1	56.7	54.8	60.5	66.0	69.5
28.	BB.	52.7	62.9	62.0	59.2	65.3	60.6
29.	CC.	66.2	57.7	53.5	59.1	43.3	40.7
30.	DD.	54.0	63.6	56.3	58.0	69.1	65.4
31.	EE.	47.4	55.9	53.0	52.1	76.6	88.8
32.	FF.	35.6	60.1	49.4	46.0	--	--
Avg.	1924	69.9	75.6	74.3	73.3		
Avg.	1923	78.4	81.5	83.7	81.0		
Avg.	1922	77.2	74.3	72.5	74.7		

Total Production - 2,637,300 N.T.
Total Shipments - 2,592,600 N.T.

The above figures cover 96.1% in capacity of the Independent Sheet Steel Manufacturers, and represent 71.3% of the total sheet steel industry, having productive capacity of 3,491,000 Net Tons. The balance is represented by American Sheet, 25.0% and mill statistics unobtainable, 3.7%

Basis for calculation of capacity tonnages:
Sheet Mills --- 7.65 N.T. per turn
Jobbing Mills---22.635 N.T. per turn
800 turns (16 turns per week for 50 weeks)

Mr. Walter C. Carroll, vice president of the Inland Steel Company, has been almost untiring in his effort and zeal in introducing and fostering this program; likewise, the Metal Branch of the National Hardware Association have been giving to it much of time and effort. It remains now for the industry itself to get back of the program with constant and determined support. Mr. Carroll will report more at length on this matter, later during these meetings.

*Address before the Sheet Steel Executives' Annual Meeting, White Sulphur Springs, W. Va., May 5, 1925.

†President, National Association Sheet & Tin Plate Manufacturers, Pittsburgh, Pa.

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Trade Extension Project.

After years of consideration and effort, and following a definite and final presentation of the matter at White Sulphur a year ago, the sheet steel industry at that time adopted and has entered into, a three-year trade extension and advertising effort.

Already the effects of this work are being felt. The effort is both broad and comprehensive. There is every reason to believe that it is most timely, and that it will result in restoration of lost markets, the discovery of new markets, as well as in the widening and intensifying of all markets for sheet steel, and the products manufactured from sheet steel.

In this movement, manufacturers representing 90 per cent of the independent capacity of the country, are engaged. As the importance and value of the work is unfolded and better understood, it is not unlikely that other manufacturers will join in the undertaking, so that the work may be enlarged and accelerated.

We regard this as one of the greatest and most far-reaching movements ever undertaken by the industry, and has been possible only because of the work of the Association which you manufacturers have created and to which you have extended such constant sympathy and support.

Activity of the Industry for First Quarter of 1925.

For the first quarter of this year, 1925, the independent mills, comprising about 75 per cent of the entire industry, operated at about 87 per cent, with a production of 920,000 net tons, or 95 per cent of capacity. This compares with a production of 882,000 tons, or 93 per cent in first quarter of 1924, and 826,000 tons, or 90 per cent, in first quarter of 1923. The first quarter of this year represented the largest tonnage, both in production and capacity, of any quarter of record.

The statement covering the first quarter of each of the last three years, is interesting. For the last three years, the first quarters have been the best, in point of production and shipment.

	First Quarter 1925		First Quarter 1924		First Quarter 1923	
Capacity ..	969,000	100.0	947,000	100.0	912,730	100.0
Per cent Operations	86.7		86.4		88.8	
Production.	920.550	95.0	882,600	93.2	826,600	90.6
Sales	783,920	80.9	720,700	76.1	906,600	99.4
Shipments..	864,350	89.2	790,700	83.5	821,800	90.1

Relation of Sheets to Steel Production.

I sometimes think that many of us do not fully realize how important a division of the iron and steel business the sheet steel industry really is. During the year 1924, the total production of finished steel in the United States amounted to something over 30,000,000 tons. Of this amount, 3,700,000 tons, or more than 12 per cent, represented sheet steel.

There are only two other divisions of the steel industry, which consistently rank higher in tonnage production than does the sheet steel branch. These are, first, bars and shapes, and second, plates; and from the very nature of those products, it is entirely natural that this should be the case.

DISTRIBUTION OF PRODUCTION OF FINISHED STEEL, YEAR 1924

	Net Tons	% of Total	% Decline	1923 % Total	1922 % Total
1. Bars and Shapes	5,000,000	16.5	24	18.5	15.5
2. Structural Shapes	3,953,000	13.1	1*	11.0	10.3
3. Sheets	3,700,000	12.3	5	11.1	12.9
4. Tubing and Pipe	3,491,000	11.5	18	12.0	13.0
5. Plates	3,444,000	11.4	25	13.0	12.8
6. Wire Products..	2,578,000	8.5	14	8.5	10.1
7. Rails	2,487,000	8.2	20	9.0	10.8
8. Tin Plate.....	1,531,000	5.0	4	4.5	5.2
9. Hoops, Bands and Cotton Ties.....	954,000	3.1	8	2.5	1.8
10. Angle Bars, Steel Ties and other track accessories	786,000	2.6	11	2.5	2.9
11. All other finished steel products...	2,363,000	7.8	10	7.4	4.7
	30,287,000	100.0	14.4	100.0	100.0

* Increase.

1924 Total Production—30,287,000 N.T. (14.4% decrease under 1923).

1923 Total Production—35,370,000 N.T. (23.6% increase over 1922).

1922 Total Production—28,620,000 N.T.

Growth of the Industry in 1924.

On January 1st, 1923, there were in the United States, a total of 659 sheet and jobbing mills. On January 1st, 1924, there were 666; while at the first of this year, there were 702. Today there are 712.

(Entire Industry)		Per Cent to Capacity 1924	1923	1922
Total number of mills.....		702	666	659
Average capacity for 1924...	4,898,000			
Per cent of operation.....		69.9	79.3	77.2
Total Production, 1924.....	3,700,000	75.6	83.0	72.7
Total sales	4,001,700	81.7	76.3	83.6
Total shipments	3,639,000	74.3	84.3	72.5

Unfilled tonnage, January 1, 1925..... 971,000 N.T.
Unfilled tonnage, January 1, 1924..... 608,700 N.T.
Unfilled tonnage, January 1, 1923..... 987,265 N.T.

Classification of Shipments.

We have seen that the sheet steel industry has expanded rapidly, and that it stands third among the branches of the iron and steel industry as a whole. It is interesting to learn in just what manufacturing lines, this vast tonnage of sheets is consumed.

CLASSIFICATION OF SHIPMENTS OF SHEET STEEL
Twelve Months Ending December 31, 1924.

Class	1924 Per Cent	1923 Per Cent
1. Automotive Industry	35.3	37.7
2. Jobbers	13.8	13.0
3. Electrical Manufacturers	7.3	7.8
4. Roofing	5.9	5.2
5. Barrel and Keg Manufacturers.....	4.5	4.3
6. Stove and Range.....	3.4	3.5
7. Refrigerators and Range Boilers.....	3.2	3.2
8 Metal Furniture	3.0	2.8
9. Culvert and Flume	2.8	1.9
10 Building Construction	2.6	2.2
11 Water Troughs and Grain Bins.....	2.3	1.9
12. Export	2.1	4.0
13. Car Builders	1.9	1.8
14. Farm Implements	1.2	1.9
15. Tack and Nail Plate.....	.4	.2
16. Casket and Vault Mfgrs.....	.4	.2
17. Miscellaneous	9.9	9.2
	100.0	100.0

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Production—Shown by Figure Picture 1924.

Last year I called your attention to the remarkable record of production to capacity, as compared with percentage of mechanical operation. During 1924 this spread between percent of production to capacity, and mechanical operation, has been greatly increased. The average rate of mechanical operation for the year, was 69.9 per cent; the average production to capacity, was 75.6 per cent, or a spread of almost six points. For 1923, the mechanical operation was 78.4 per cent, and production to capacity 81.5 per cent, or a spread of three points.

To my mind, they clearly demonstrate a most remarkable increase in operating efficiency. Whether this has been due to the installation and use of more modern equipment and mechanical devices, or to increased efficiency on the part of the workmen, I do not know; probably it was both.

The total production record as shown on the Figure Pictures for the last three years, is as follows:

		Representing % of the Industry
1922	2,321,000 N.T.	68.7
1923	2,746,300 N.T.	70.9
1924	2,637,300 N.T.	71.3

Production figures, in all cases, represent hot rolled sheets.

Shipments.

Shipments during the year for the group, were 2,592,600 N.T., or about 225,000 tons less than in 1923. The record of shipments for the last three years, is as follows:

		Representing % of the Industry
1922	2,264,000 N.T.	68.7
1923	2,819,000 N.T.	70.9
1924	2,592,600 N. T.	71.3

Shipments of full finished sheets are calculated on the basis of prime product, plus 10 per cent for seconds.

The Value of Statistical Data.

There is nothing particularly ornamental about any mathematical table, though, if studied carefully, there are often unfolded, many pictures of real interest — sometimes of inspiration, other times of disappointment. If, however, they bring to us a better understanding of the conditions with which we must cope, in our day-to-day life, then they are good pictures. I submit, however, that they must be studied to be either understood or appreciated.

Secretary Hoover, of the Department of Commerce, makes the statement that:

> "There is no question but that the curves in the business cycle from activity to depression have been less disastrous in those industries or trades where accurate statistical data have been available to all. Fundamentally, it is impossible for business men to form those vital judgments as to their future course of action in the wise and safe direction of their business unless they are informed as to the changing currents of production and consumption."

Consumption as the Barometer on Which Production Should Be Based.

It is unfortunate for the nation, at times, that industrial groups are not permitted, legally, through agreement or otherwise, to regulate or to some extent control expansion or production.

This is borne out, I think, in a contribution by Secretary Davis of the Department of Labor, written for the New York "Times", wherein he calls attention to the predilection of American industry to overdevelop.

In this, Secretary Davis suggests that many believe the coal industry is the only industry over-developed. He shows, however, that other industries are just as vitally affected. He points out that with our present iron and steel equipment the country can produce enough iron and steel products in seven months to glut the country; that the window glass factories of America, within a period of 17 weeks, can supply all the glass the nation could use in a year; that the overdevelopment of the shoe industry is a serious thing to that industry. He mentions that there are 1,542 shoe factories in the United States; that 14 per cent of these do 65 per cent of the total business; and that if these 14 per cent operated full capacity and full time, these plants alone could produce all the shoes used in America.

He then points out that production should be so controlled that labor will be protected from a period of savage idleness, due to starvation wages, losing working time, and over-development of industry, all of which necessarily contribute to unrest, strikes, and attendant miseries. The Secretary, in this article, issues a timely warning against the tendency of industry to over-extend in either building or production. Manifestly, stability in hours and rates of labor must be affected by production and prices at which finished commodities can be marketed.

Applying all these thoughts to the Figue Pictures which have been presented for the last three years, let us see whether or not the statements of Mr. Hoover and others are justified and borne out by the results as shown.

For eight years, sheet steel makers have been contributing to and receiving monthly production and shipment reports, and careful observation and study of these reports indicate that market stability has existed to the extent that uniformity has prevailed in rate of operations.

Industrial Harmony.

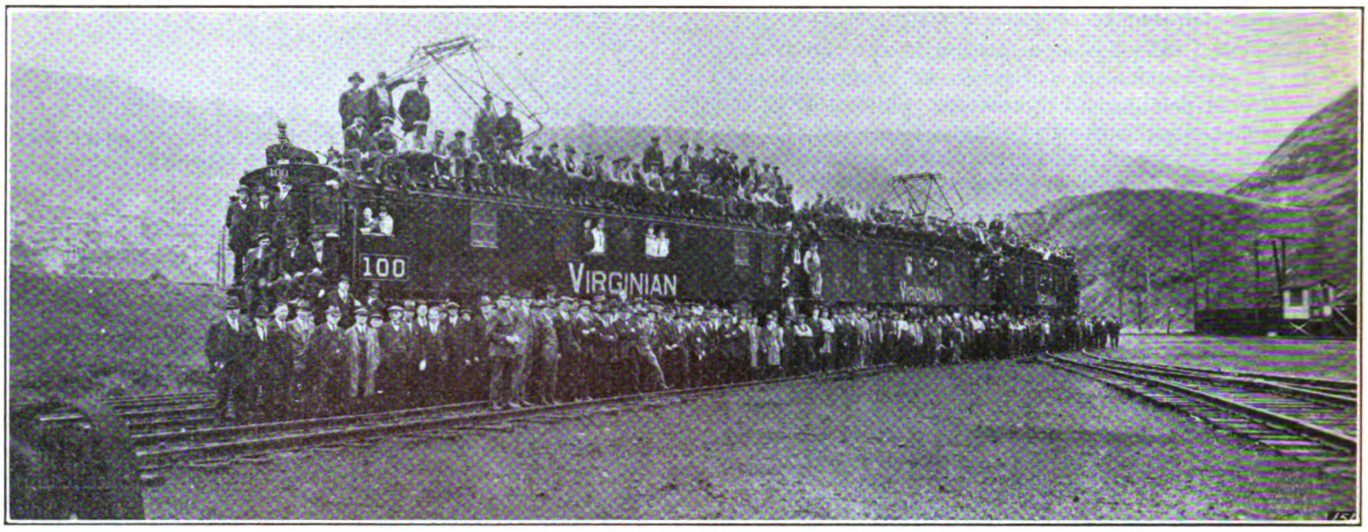
One of the greatest problems of life, and probably the most difficult, but none the less necessary, is that of maintaining harmonious relationship with our neighbors — this whether in international, national, social, business, or domestic life.

In all ages, man has been reaching out and striving for peace, though the efforts to obtain it have often been sought through instruments of warfare and strife.

The purpose of these annual meetings, is to deepen friendships and to promote better understanding among members of the industry.

What appears to be one of the most significant developments of recent years in American industrial life, is the tremendous progress that has been made in the matter of co-operation and mutual understanding between the men who manage industry, and the men whose labor makes industry possible.

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



Giant of 7,125 H.P. shows efficiency in track tests.

World's Greatest Electric Locomotive

The world's greatest locomotive, an electric giant 152 feet long, weighing 1,275,900 pounds and with a rating of 7,125 hp., underwent its first running test May 14 on the Westinghouse electric test track.

Witnesses of the running tests of the locomotive, the first completed of 36 ordered by the Virginian Railway for its $15,000,000 electrification project between Mullens, W. Va., and Roanoke, Va., included representatives of the Virginian, the Pennsylvanian, the Baltimore & Ohio, and the Pittsburgh & Lake Erie railroads, the American Locomotive Company, the Baldwin Locomotive Company, the R. D. Nuttal Company, the Westinghouse Airbrake Company and the Westinghouse Electric & Manufacturing Company.

The huge locomotive, under its own power for the first time, demonstrated the marvelous efficiency of the electric locomotive. Tests of its acceleration and its various speeds; tests of regeneration, the remarkable ability of the electric locomotive to regenerate power while taking heavy coal trains down steep grades and to turn the power back into the transmission line; and tests of the power of the motors, were made. It was demonstrated that by locking some of the wheels and throwing power on others, the wheels could be slipped without injurious effect to the motors, thus proving that no matter what the exigencies of the occasion, the electric locomotive will be equal to them.

The Virginian locomotives are so huge that it was necessary to build them in three units each so that the great length of more than 150 feet could successfully negotiate curves, and otherwise be controlled efficiently. Each motive power unit has the Mikado 2-8-2 wheel arrangement, the weight of the cab being approximately 425,000 pounds, so that the weight of the three cab road engines is 637.5 tons. Each driving motor has mounted at each end of the shaft a pinion which meshes with a flexible gear and the gears are mounted on a jack shaft, the power being transmitted from the gear centers to the drive wheels by means of side rods.

The mechanical parts of the locomotive, such as cabs and trucks, were supplied by the American Locomotive Company.

To provide for the application of greater power to the transmission system, the Virginian locomotives have been designed for either 11,000 or 22,000 volts between the trolley and rail.

The Virginian electrification contract was the largest ever awarded, amounting to $15,000,000, all electrical apparatus to be furnished by the Westinghouse Company. The electrification includes 133.6 miles of route and 213 track miles. The power plant for supplying the 11,000-volt or 22,000-volt alternating current is rapidly nearing completion. A part of the overhead caternary structure has been installed and the remainder of the locomotives, after the first is delivered, will be shipped from the Westinghouse works on a schedule of one or two monthly. It is expected that complete operation of this section will be started before the close of the present year.

The U. G. I. Contracting Company of Philadelphia has lately received word from Middletown, Conn., Gas Light Company to remodel its water gas apparatus.

Hugh Morrow, former vice president of the Sloss-Sheffield Steel & Iron Company, Birmingham, Ala., was elected president of the company.

The Judson Manufacturing Company, 604 Mission Street, San Francisco, Cal., operating a steel fabricating plant in Oakland, Cal., has acquired a tract of land adjoining the works, totaling about 25 acres, and has tentative plans under consideration for the erection of additions to the rolling mills and fabricating works. It has not been definitely decided as to time of building the structures, but likely to be during the spring. It is proposed to develop a large increase in the present output.

Generated on 2024-09-07 22:28 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Expansion Steam Bends

Continuation of Series of Formulae Suitable for High Super-heats

By P. M. GALLO,* M.E.

PART II

IN the first section of this article, the author used a series of notations, which greatly simplified the details of his discussion. The same method is employed in this second section.

Notations Limited to Flanged Joint Investigation.

X = distance, neutral axis to center of pressure. (See Fig. 7.)

D = outside diameter of lap.

Dl = inside diameter of lap or pipe.

$+P_b$ = total equivalent stress, compressive, applied at center of pressure.

$-P_b$ = total equivalent stress, tension, applied at center of pressure.

N_b = number of bolts in flange.

S_u = tensile total stress in each bolt, if $-P_b$ were applied at center of flange or pipe, pounds.

a, b, c, d,—be the distance, inches, from neutral axis y-y to each successive pair of bolts, see sketch Fig. 7.

S_e = stress, total, in each bolt (1) and (8), due to the moment of eccentric pressure or stress $-P_p$, only; pounds. (See Fig. 7.)

S_s = total stress in each bolt due to the longitudinal steam pressure, pounds.

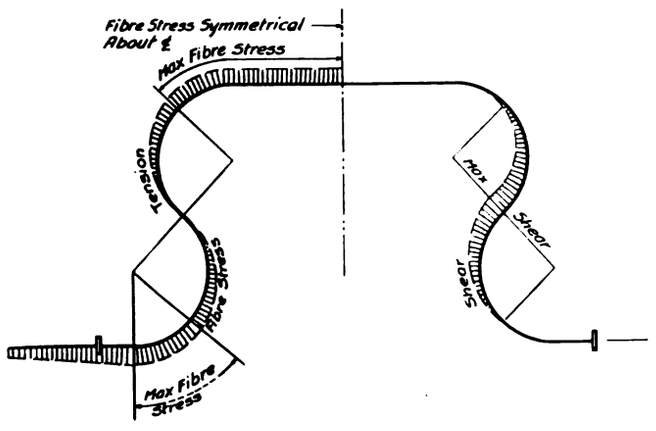


FIG. 6-A.—*Double offset expansion bend.*

S1, S2, S3, S4, S5, S6, S7, S8 = final total stresses in each bolt 1, 2, 3, 4, 5, 6, 7, 8.

R_m = resisting moment of bolts toward eccentric loading.

I_b = moment of inertia of the bolts about the neutral axis, y-y, = $2a^2 + 2b^2 + 2c^2 + 2d^2$. See Fig. 7.

X_b = distance from neutral axis to center of resistance of bolts in upper half of flange.

S_b = summation of resisting stresses in bolts in upper half of flange.

g = distance, inches, between centers of pressure of lower half of raised face, male or female surface, and the bolt in upper half of flange = $X + X_b$.

C_f = coefficient of friction flange sliding on gasket.

S_{bt} = Summation of bolt stresses forcing flanges together.

Fig. 7 shows a 10-inch 250-pound Van Stone joint. Assume a bending moment applied to this joint so that the upper half is in tension, and the lower half in compression as indicated in the sketch. The resisting moment of the pipe is $21 \div dxs$, where is the maximum allowable stress in the pipe adjoining flanges. This moment can be considered as transmitted across the joint by two forces $+P_b$ and $-P_p$ applied at the center of pressure of the lower and upper half laps separately. This center of pressure is "x" distance from the neutral axis. The compressive force $+P_p$ is transmitted by direct compression of the lower halves of the abutting laps and can be considered as a continuity of the pipe. The tensile force $-P_b$ is transmitted in the upper halves of the laps to the flanges and then to the bolts. This case can be considered as a flange eccentrically loaded. The above method of applying the center of pressure is practically close enough, only, when the radius of the laps is two or more times the pipe wall thickness and for short laps, not bolt hole laps. The Crane Co's. standard laps are short laps, and the lap must be full pipe thickness.

Following are the equations for investigating Van-Stone joints under bending:

$$X = .2946 \frac{D^4 - Dl^4}{D^3 - Dl^3} \qquad \text{Eq. F1.}$$

$$+P_b = -P_b = \frac{1S}{Xd} \qquad \text{Eq. F2.}$$

$$-S_u = \frac{-P_b}{N_b} = \text{tension as sign indicates.} \qquad \text{Eq. F3.}$$

$$R_m = \frac{2S_e}{d}(2a^2 + 2b^2 + 2c^2 + 2d^2) = \frac{2S_e}{d} I_b \qquad \text{Eq. F4.}$$

$$R_m = -P_b X = \frac{2S_e}{d} I_b \qquad \text{Eq. F5.}$$

$$S_e = \frac{-P_b X d}{2I_b} = \text{tension above and compressive below neutral axis.} \qquad \text{Eq. F6.}$$

S_e is negatives or tensile stress above the neutral axis, y-y, and positive or compressive stress below it.

$$S_s = \frac{P_s \pi Dl^2}{4N_b} \qquad \text{Eq. F7.}$$

*Pittsburgh, Pa.

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

The total stress in the various bolts is then as follows:

Bolts — (1)-(1) = $-S_u+(-S_e)+(-S_s) = -(S_u+S_e+S_s)$ tension

" — (8)-(8) = $-S_u+S_e+(-S_s)=(S_e-S_u-S_s)$

" — (2)-(2) = $-S_u-\frac{S_e}{d}C+(-S_s) = -(S_u+\frac{S_e}{d}C+S_s)$ tension

" — (3)-(3) = $\frac{S_e}{d}S_u---b+(-S_s) = -(S_u+\frac{S_e}{d}b+S_s)$ tension

" — (4)-(4) = $-S_u+(\frac{S_e}{d}-a)+(-S_s =$

$-(S_u+\frac{S_e}{d}a+S_s)$ tension

" — (5)-(5) = $\frac{S_e}{d}S_u+(-S_u)+(-S_s) =$

$(\frac{S_e}{d}a-S_u-S_s)$

" — (6)-(6) = $-S_u+\frac{S_e}{d}b+(-S_s) =$

$(\frac{S_e}{d}b-S_u-S_s)$

" — (7)-(7) = $-S_u+\frac{S_e}{d}c+(-S_s) =$

$(\frac{S_e}{d}c-S_u-S_s)$

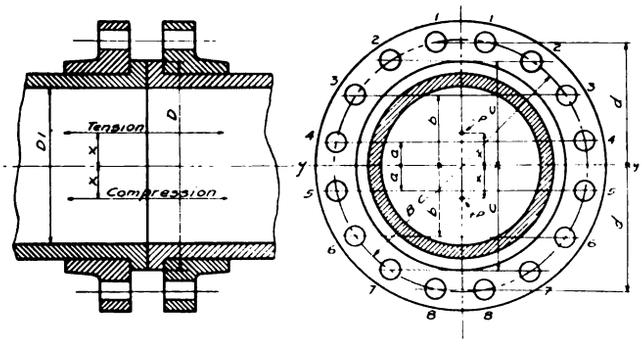


FIG. 7.—10-*in. Van Stone joint.*

Bolts (8)-(8) are given directly under bolts (1)-(1) to show the two extremes together. The other bolts are not so important but are given to show the method of finding the stress in same if so desired.

The actual stress to which bolts (1)-(1) are tightened up should be at least 15 to 20 per cent more than above calculated, which excess keeps the gasket from blowing out and prevent leakage. Therefore the stress to which bolts (1)-(1) are tightened up is $-1.2(S_u+S_e+S_s)$ pounds.

This concludes the investigation of a Van Stone flange under a bending stress.

Investigation of Screwed or Welded Flanges.

These act entirely different from Van Stone flanges. Using the same Fig. 7, and consider the flanges monolithic with the pipe, and the laps as the raised face or the male of male and female flages.

The magnitude and center of pressures or stresses, $+P_b$ and $-P_b$ are determined the same as before. In this case the lower half of the bolts do not come into action at all and are therefore not considered Only the upper half of the bolts resist the tension $-P_b$. Therefore in this case $I_b = (a^2+b^2+c^2+d^2)$ and

$$Rm = -P_b x = \frac{2S_e}{d} I_b = \frac{2S_e}{d}(a^2+b^2+c^2+d^2)$$

Eq. F8.

The summation of all the bolt stresses equal $S_b = \frac{2S_e}{d}(a+b+c+d)$ Eq. F9.

The distance from the neutral axis, y-y, to the center of resistance of the upper half of bolts is

$$X_b = \frac{\frac{2S_e}{d}(a^2+b^2+c^2+d^2)}{\frac{2S_e}{d}(a+b+c+d)} = \frac{(a^2+b^2+c^2+d^2)}{(a+b+c+d)}$$

Eq. F10.

Then

$R_m = S_b X_b$ Eq. F11.

X_b is always larger than X, the bolt circle being necessarily larger than the pipe.

Since the sum of all internal stresses must equal zero, then it follows that S_b must equal $+P_b$. Since X_b is always larger than X, it follows that the neutral axis must shift to accomodate the laws that the sum of all stresses must equal zero and the sum of all moments must equal zero. Since $X_b > X$, the neutral axis shifts toward X_b. In the Van Stone joint this shifting of the neutral axis need not and does not take place, because the flanges being independent of the pipe, the bolt stresses around the whole flange accomodate themselves to satisfy the laws of zero stress and zero moments. The exact displacement of the neutral axis is immaterial and would be a complicated and tedious calculation. For practical purposes it is close enough to work on the following basis: Make the resisting moment of the joint equal to the resisting moment of the pipe, using as lever arm the distance from X to X_b or $(X + X_b)$.

The resisting moment of the pipe is $\frac{2I_s}{d}$

X is determined as previously.

X_b is determined by Eq. F10.

Then $g = X + X_b$ Eq. F12.

$$S_b = \frac{\frac{2IS}{d}}{g} = \frac{2IS}{gd}$$ Eq. F13.

Solving Eq. F9 for S_e:

$$S_e = \frac{S_b d}{2(a+b+c+d)}$$ Eq. F14.

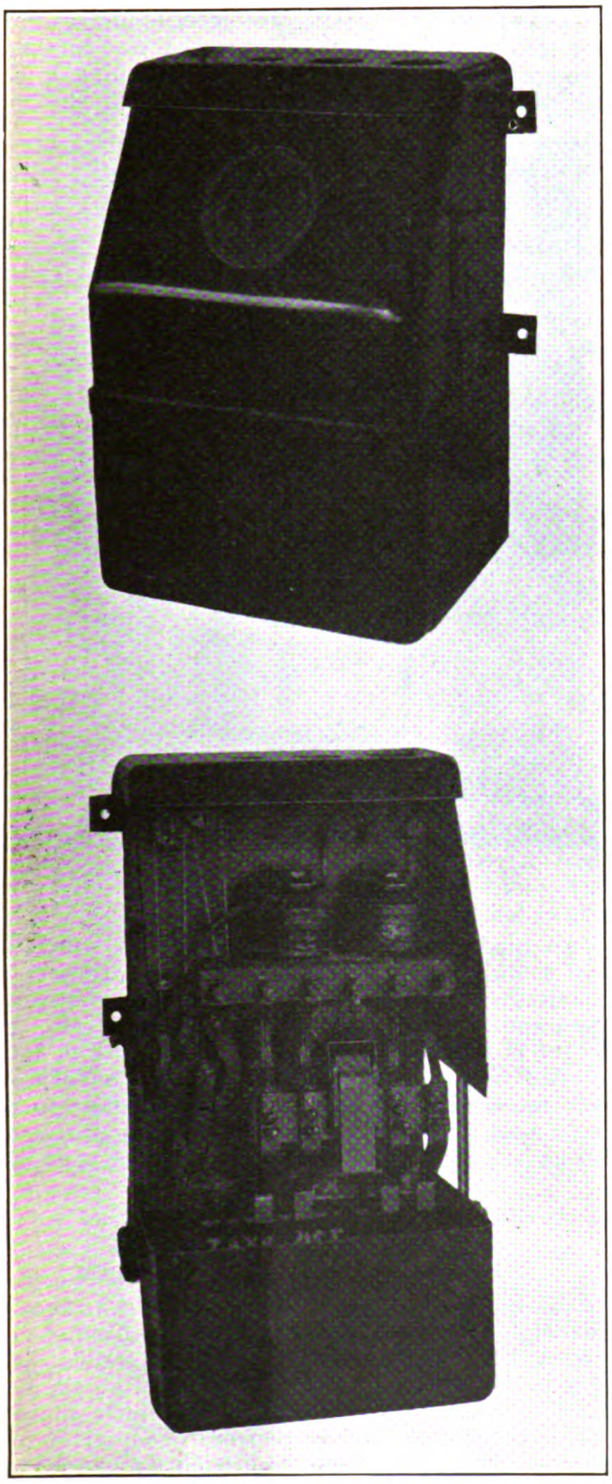
Substituting in Eq. F14 the value of S_b found from Eq. F13 the stress S_e is determined. Note: If the neutral axis displacement is not too great, when passing through the center of "g" the quantity (a+b+c+d) should be based on its new location. Otherwise a recalculation of X_b will be necessary, which would somewhat shorten the value of "g" thereby in-

(Continued on page 265.)

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

WITH THE EQUIPMENT MANUFACTURERS

New Push-Button Starting Switch



The Electric Controller & Mfg. Company has just announced a new push-button operated oil switch for starting squirrel cage induction motors directly across the line.

The device is known as the Type ZO starting switch and is controlled from one or more push-button stations which may be located at convenient points. The starting switch is provided with four pairs of heavy contact fingers, three of which handle the main line in the case of three-phase or two-phase three-wire motors, and the fourth pair handles the control circuit to the push-button when the switch is arranged for no-voltage protection. In the case of two-phase four-wire switches all four lines are disconnected in the "off" position when the switch is wired for no-voltage release. When wired for no-voltage protection one line runs direct to the motor.

The Type ZO starting switch uses a very accurate inverse time element temperature overload device which consists of two alloy wires each, attached at one end to an adjusting screw, and at the other end to a multipling lever which operates a quick make and break contact. The wire is connected across the secondary of a small current transformer. The gauge of the expansion wire and the winding of the secondary of the transformer remains the same regardless of the horsepower ratings, or voltage, of the switch and the size of wire and number of turns of the primary is proportioned to suit the rating of the motor. An increase in current or an overload on the motor produces an increase in the current flowing in the secondary circuit, which causes the expansion wires to lengthen and, if the overload is severe enough, or is of sufficient duration, the wires lengthen sufficiently to trip the overload relay contacts, causing the starting switch to open and disconnecting the motor from the line. The wires then cool and the overload relay contact automatically resets if a switch is wired for no-voltage protection. A hand reset of the overload device by means of a small button projecting through the case is provided on switches arranged for no-voltage release.

The overload device protects the motor against injury due to phase failure. If an attempt is made to start the motor with one phase open, the switch will open in less than five seconds, and the manufacturers state that it is impossible to burn out a motor due to phase failure or overloading when protected by this starting switch.

The oil tank is drawn from a single piece of sheet steel and can not leak oil. The tank latches are arranged so that the tank can be lowered and left suspended to catch oil dripping from the contacts while the switch is being inspected.

On account of creepage of oil due to capillary attraction and from a slight splashing when the magnet surfaces engage, all moving parts of the switch are kept lubricated, which protects the switch from corrosion when installed in corrosive atmospheres.

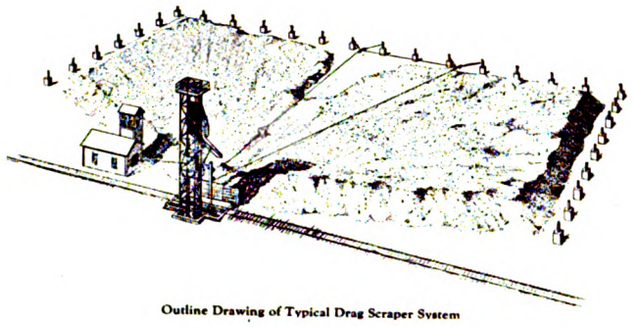
Type ZO switch is arranged for conduit connection and is of compact dimension, 13 in. high by 9 in. wide.

Generated on 2024-09-07 22:18 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

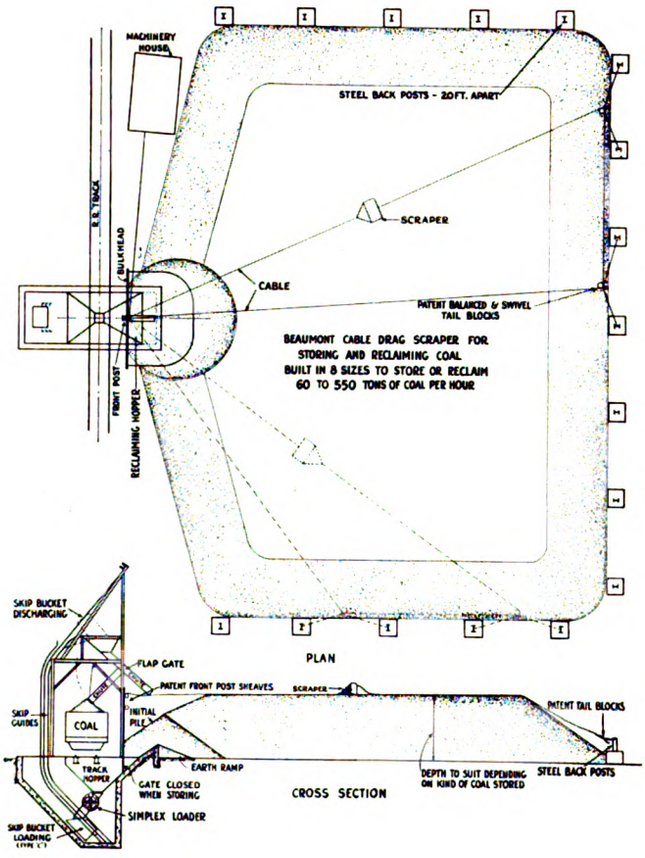
The Drag Scraper

While the drag scraper lends itself to many applications, where various bulk raw materials are to be stored and subsequently withdrawn for use, it is ideal for coal handling.

The Beaumont equipment and method illustrated in the figures shown form an arrangement whereby coal can be taken out of cars and stored and again taken from this storage and placed in cars by a single operator. This man operates the drag scraper by means of a single lever.



Outline Drawing of Typical Drag Scraper System



The skip hoist, which is used both for taking coal from the car and discharging it on the "initial pile" on the coal storage area, or taking the coal as it is reclaimed by the drag scraper and placing it in the car, is entirely automatic and needs no operator.

A very important feature of this drag scraper system of coal storage is that spontaneous combustion—arch enemy of stored bituminous—is almost eliminated if "cone" piling is avoided. Unfortunately the locomotive crane or any system of conveyors piles the coal in "cones," which leads to a natural separation of fines and coarse, and spontaneous combustion is then difficult to avoid.

This insurance against spontaneous combustion, coupled with low cost of handling and high capacity of equipment, has resulted in a marked popularity.

Triple Service Rivet Sets

Ingersoll-Rand Company, 11 Broadway, New York, has now produced a rivet set for pneumatic hammers which lasts longer than three, four or even more ordinary sets. Users are finding it the most

economical set they can buy because of the great increase in rivets driven per set and the avoiding of delays and losses of time due to breakage. This new set is called the "Jackset."

It is made of a high quality alloy steel, which will stand a much greater degree of heat from hot rivets, without the temper becoming drawn. It is specially forged and then heat treated by a new process. This new set is the result of years of experience in building rivet sets and of hundreds of tests on different steels and heat treatments, made in the effort to produce a tool better able to withstand the stresses of riveting service than the ordinary carbon steel rivet set.

Silent Chain Drives from Stock

Link-Belt Company of Indianapolis, Chicago and Philadelphia has just announced that after many years of work and study of the problem of standardizing and manufacturing silent chain drives for stock, it has placed in operation a new plan by which complete lines of silent chain drives of from one-quarter to 10 hp., in practically any reduction from 1 to 1 to 7 to 1, are now available for immediate delivery, by distributors located in many principal cities of this country.

Back of these distributors will be immense stocks carried in reserve in the warehouse of the company's factories at Indianapolis and Philadelphia.

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

For more than 20 years the installation of silent chain drives has been an engineering problem. Under the Link-Belt plan it remains somewhat of an engineering problem, but one which has been simplified in conveniently arranged tables, which have been published in book form for distribution by this company.

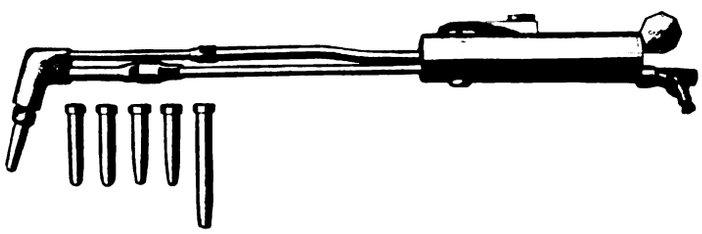
The many details which had to be considered before this plan could be put to practical use are interesting, but to relate them here would require too much space.

The stock drive chain is of the same high standard of quality, as those that are built for special application. The patented bushed joint construction shown in Fig. 2 is the same in the standard stock drive chains as it is in the standard Link-Belt silent chain used for the past 20 years in industrial drives. Distributors are being appointed as rapidly as it is possible to secure the type which will assure Link-Belt service.

That the tendency to use this efficient drive under this plan will receive added impetus, is evidenced by the large increase in sales which the Link-Belt Company reports since its adoption.

Combination Cutting and Welding Torch

A low pressure torch which will operate on either low pressure or high pressure gas with equal efficiency. It is especially constructed to operate with low pressure acetylene gas, city gas or hydrogen. It is excellent for use with a low pressure acetylene generator.



This torch is very efficient and utilizes the highly specialized and standardized parts of the Milburn cutting and welding torches. It insures a correct and intimate mixture of the oxygen and acetylene resulting in "super mixing" and non-flashback qualities.

This torch is adapted to preform welding as well as cutting work by the mere interchange of tips. It performs practically all the cutting and welding operations within range of the process with highest efficiency and economy.

The torch is of bronze forgings and special seamless tubing, constructed to withstand constant service. The tips are made of solid copper and are interchangeable with a large number of low pressure torches of other makes. This torch carries with it the same guarantee as the company's Standard Milburn apparatus.

Expansion Steam Bends

(Continued from page 262.)

creasing the bolt stress S_e. Whether it will be necessary to recalculate X_b will suggest itself during the operation A given shift of the neutral axis that would seriously effect the results in a six-inch joint, would make no appreciable difference in a 16-in. or 18-in. joint.

The stress on the remaining bolts in the upper half flange is determined the same as previously except that the neutral axis is taken through the center of "g", thus shortening the lever arms a, b, c, d, by the displacement of the neutral axis, that is from center of piped flange to center of "g".

If the whole face of the screwed or welded flange joint abutted, even with a full-face copper gasket between, the whole calculations would be very simple, but flanges are not made that way and it is better to adhere to standard material.

This concludes the investigation of screwed and welded flanges.

The conclusion is that Van Stone joints in this case give better satisfaction and the magnitude and distribution of the stresses can be more accurately determined.

Investigation of Flanges at Points of Inflection.

At these points the shear is a maximum and the fibre stress or bending moment is zero. The total shear equals "P" and is figured by Eq. 1. The bolt holes are ⅛ in. large in flanges, thus permitting a sliding of ⅛ in. between flanges. Therefore the frictional resistance to sliding is a function of the summation of all bolt stresses $= S_{bt}$. It is impossible to determine the sliding resistance with any degree of accuracy as it depends on the surfaces of the gasket, flanges, and on the summed bolt stress S_{bt}. If C_f is the coefficient of friction and S_{bt} = summation of bolt stresses, and P = the shearing force tending to slide the flanges on each other, then

$$P = < \frac{S_{bt} \times C_f}{2} \qquad \text{Eq. F15.}$$

If $P = \frac{S_{bt} \times C_f}{2}$ then the factor of safety is only 2. Since the shearing resistance transmitted by a flanged joint is so indeterminate, the flanges should be made male and female, especially the Van Stone joint where the extra length of bolts and space between flanges admit of greater sliding range.

This concludes the investigation of flanged joints transmitting shear, being placed at points of inflection

In calculating the shear at points of inflection, where curves of different radii join, use R and S of the larger curve the same as for fibre stress "S".

Pipe bends in general are made to a radius of five pipe diameter $= 5\ d_r$. Therefore $\frac{d_r}{R} = 1/5 = .2$. That is about the limit where no correction need be made due to the displacement of the neutral axis according to the theory of flexure of curved beams. If the radius is made smaller it is well to consider the change in stresses due to the displacement of the neutral axis.

(To be continued.)

Generated on 2024-09-07 22:24 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

TRADE NOTES AND PUBLICATIONS

Oil Purification

A new DeLaval bulletin says that eleven utility companies in North America have yearly outputs in excess of 1,000,000,000 kwh. All but one now use DeLaval purifiers on lubricating oil, insulating oil, or both. Eighteen companies have yearly outputs of from 500,000,000 to 1,000,000,000 kwh. Thirteen companies of this group are operating DeLavals—one concern having thirty of them in its various stations.

These large utility companies have proved to their own satisfaction that DeLaval centrifugal purification is the better way of maintaining the efficiency of turbine or Diesel lubricating oil and that the dielectric strength of transformer oil, switch oil and other insulating oils can be maintained at less expense by centrifugal dehydration.

Hundreds of other DeLaval oil purifier installations are proving that cleaner, centrifugally treated oil means lower operating costs in the small power plant as well as in the large one. No matter whether you generate 500 kw. or 500,000 kw., a purifier of the proper size will save many times its cost.

"The Milburn Light," and "Milburn Welding and Cutting Apparatus," are the titles of two effective small booklets just off the press for the Alexander Milburn Company of Baltimore. The Milburn light picturizes a few of the many applications of acetylene to the difficult field of steam shovel and locomotive operations. The second booklet is devoted to description and specification covering Milburn torches, both for welding and cutting, repair kits, pressure regulators and gauges, as well as compressing plants and generators.

Stewart industrial furnaces are well illustrated in a two-color bulletin just issued. Various types of the 150 standard styles and sizes are shown, including a two-door hammer forge, Stewart tilting, special turning and dipping, Stewart special forge, and the No. 10 oven. A testimonial letter from Pawling & Harnischfeger Company, with a view showing their heat treating room and a Stewart furnace, is included.

Reorganization of Mesta Executive Board

Mr. F. E. Mesta, formerly vice president and general superintendent, has been elected by the board of directors of the Mesta Machine Company, West Homestead, Pa., as president and general manager, to succeed Mr. George Mesta, deceased.

Mr. H. F. Wahr, formerly secretary, was elected vice president.

Mr. J. O. Horning, treasurer of this company since its inception, will continue in that office.

Mr. G. E. Townsend, formerly assistant secretary, was elected secretary.

The directors of the Mesta Machine Company are: Mr. F. E. Mesta, Mr. J. O. Horning, Mr. H. F. Wahr, Mr. W. J. Hirth and Mr. G. E. Townsend.

The Merchandise Warehouse in Distribution

The Department of Commerce has just released a bulletin on "The Merchandise Warehouse in Distribution," which offers a study of the services and best practices of the warehouse industry. The report portrays the advantages, services and opportunities presented by storage warehouses, correlating these services with their relations to transportation, warehouse and distribution costs, credit, and handling and storage rates.

Most of the important warehouse services are considered in this study which is approached from the angles of better transportation in supplying public needs, reduction of loss and damage claims, lower transportation charges by carlot distribution from a central distributing point, advertising in conjunction with warehouse distribution and warehouse costs.

Comprising 33 pages, this bulletin presents not only written material relative to the uses of the many services of warehouse distribution, but contains also a number of tables on freight rates and a "zero" basis of rates, determined by an actuarial survey, which allows any warehouseman to apply a factor for his basic revenue needs and have a complete scale easily available.

This bulletin is the first of a series which the Department of Commerce contemplates issuing on warehousing and distribution.

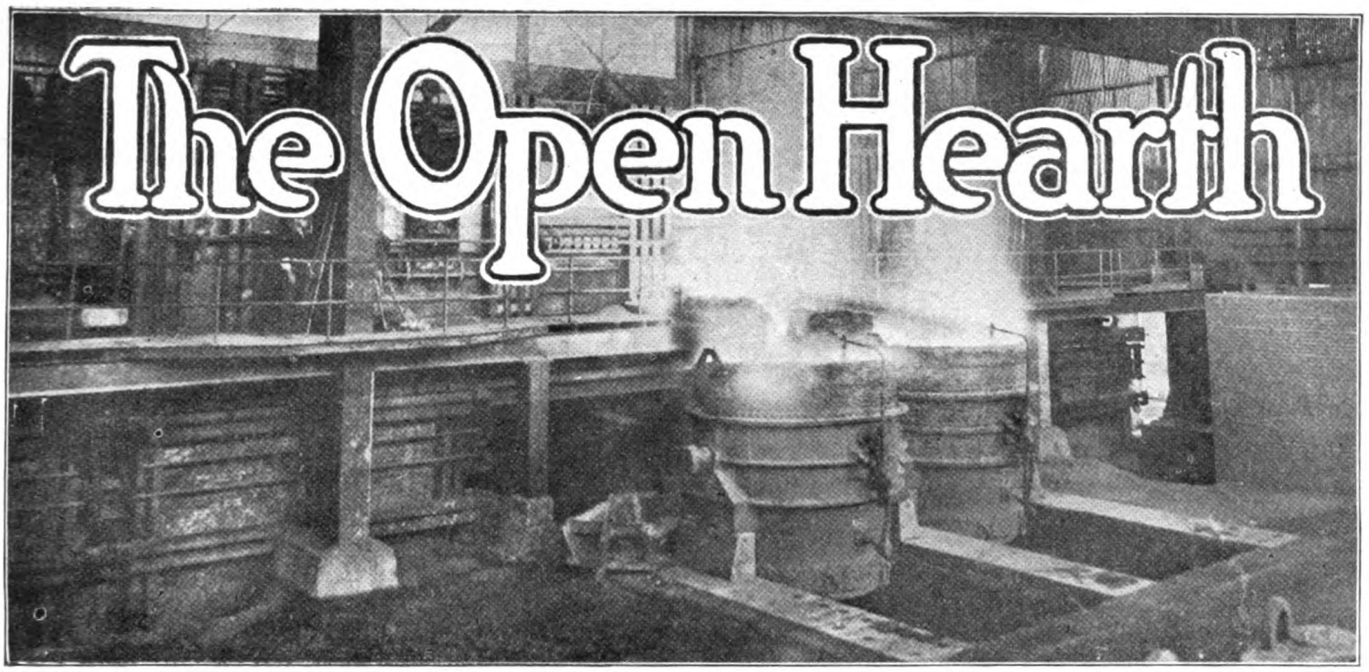
Copies of this initial volume, "The Merchandise Warehouse in Distribution," can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from any of the branch offices of the Department of Commerce at a nominal charge of 10 cents.

Warren Webster & Company, pioneers of the vacuum system of steam heating, announce a change in their Cincinnati office from 310 Provident Bank Building to Room 919 of the same building. Mr. W. C. Green will be actively in charge. Enlargement of the Columbus office is under way, with S. B. Shearer, resident engineer in charge.

The Republic Flow Meters Company announce the opening of a factory branch office in Cleveland. This office, located at 617 Engineers Building, will be in charge of Mr. L. C. Wilson, an engineer with many years' experience in power plant work. Mr. Wilson moves from the Pittsburgh office.

The business conducted previous to October, 1915, as the Reading Crane & Hoist Works, and from that date until July 1, 1924, as the Roeper Crane & Hoist Works, at which time incorporated, is now known as Roeper Crane & Hoist Works, Inc. The use of former names, and sundry variations, is the cause of confustion and delay in the delivery of mail. All future communications should be addressed to Roeper Crane & Hoist Works, Inc., Reading, Pa.; H. P. Roeper, president; A. F. Roeper, vice president; E. F. Hendricks, secretary and sales manager.

Generated on 2024-09-07 22:15 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



Proper Heat Treatment Important in Hardening Carbon Steel

By A. C. Blackall*

A valuable lecture was delivered before the Institute of Production Engineers in London recently by S. N. Brayshaw, in which experiments were described showing that the generally accepted uncertainty of success in the hardening of carbon tool steels as distinct from alloy steels is due, not to defects in the actual hardening process, but to improper heat treatment before hardening.

A series of 102 blanks was made from one ingot. Of these two were at once machined and hardened. They both broke badly. The rest were kept at 825 deg. C. for one hour, and then cooled out in air. Two blanks were then machined and hardened, and again broke badly. Varying heat treatment was given to each two of the remainder, these being heat treated for an hour at temperatures varying from 750 deg. to 900 deg. C., and afterwards "soaked" for times varying from 15 to 16 hours. Finally all were cooled out slowly in sand.

The results demonstrated that prolonged heat treatment between 715 deg. and 728 deg. C. before the hardening process proved best suited for the particular composition of steel used. The general conclusion arrived at was that the risk of distortion and breakage following hardening could in nearly all cases be avoided by a properly investigated preliminary heat treatment.

George S. Evans, formerly metallurgist, Griffin Wheel Company, Chicago, and now with the Mathieson Alkali Works, with headquarters in the same city, delivered an illustrated lecture on "Desulphurization in the Foundry," before the Chicago Foundrymen's Club at Chicago, Saturday evening, May 9. He stressed particularly the success achieved in removing sulphur from the melt in the manufacture of chilled iron car wheels.

*London, Eng.

P. A. E. Armstrong, who resigned May 12 from the Ludlum Steel Company, Watervliet, N. Y., for the past eight years has been identified prominently with the development of rustless and alloyed steel. Mr. Armstrong was vice president, general sales manager and a director of the Ludlum Steel Company. When he joined the Ludlum Company it manufactured plain carbon steel and high speed steel. During his connection with it he developed and patented a large number of high grade alloy steels which since have been accepted widely. One of his alloy developments applied to valves has made possible high altitude and long jump aeronautic flights. He developed rustless steel from cutlery use to wide engineering application.

Samuel Mather, senior member of Pickands, Mather & Company, and Harry Coulby, chairman of the Pittsburgh Steamship Company, both of Cleveland, have returned to that city after a tour around the world.

Harry L. Barnitz, Ph.G., consulting and construction engineer, specializing on oxygen, hydrogen and industrial gases, exploiting Messerschmitt hydrogen process, announces the removal of his office to 2 Rector Street, New York.

The following changes at Colorado Fuel & Iron Company have been made: Mr. J. B. Marks, assistant to president, has been relieved of duties of purchasing agent, which work will be assigned to Gerald Alley. Mr. Ward Wire is now traffic manager. Mr. H. B. Carpenter is appointed general superintendent of Minnequa Works.

Frank Garrett, formerly with the Firth-Sterling Steel Company, McKeesport, Pa., and lately with the Latrobe Electric Steel Company, Latrobe, Pa., recently has become affiliated with the Universal Steel Company, Bridgeville, Pa., in the capacity of research metallurgist. Mr. Garrett is a graduate of Lehigh University.

Generated on 2024-09-07 22:14 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Some Pointers on By-Product Coke Oven Operations

A. G. A. Meets at Atlantic City

Utility Men Plan National Research to Develop Industrial Gas Equipment

THE establishment of a national research organization to make gas available to all industrial fuel users was the proposal made at the annual spring conference of the American Gas Association by Charles A. Munroe, chairman of the Board of the Laclede Gas Light Company of St. Louis and a former president of the Association.

As outlined by Mr. Munroe, the objects of the new organization, to be underwritten by the manufactured gas companies of the country, would be to develop efficient gas burning equipment for all fuel users in industry and enable the gas companies to meet the demand for gas fuel wherever heat is required.

It is understood that Mr. Munroe has the support of other leading public utility executives for his project, and that leaders of the gas industry are studying its details with the greatest interest.

"The present tendency to conserve our national resources, especially oil and natural gas, makes it inevitable that the manufactured gas industry will have to shoulder the heating burdens of the country," he said. "The gas industry is now equipped to supply all the immediate fuel requirements for industry, millions of dollars having been spent for improvements and new construction during the past two years.

"We must now go a step farther by developing gas burning appliances to make gas the universal fuel, as it is now the most economical medium, for even the most intricate and exact of heating operations.

"Although 25 per cent of the present output of manufactured gas in this country is being used in industry, the majority of industrial fuel users are still either employing wasteful and outworn methods of combustion, or have been forced to turn to electricity, a power producer, in spite of the fact that electricity costs three times as much gas and also in spite of the fact that electric appliances cost twice as much as gas appliances.

"Heretofore no one has been able to spend enough time and money to develop the proper appliance for the utilization of gas fuel in industry. As the demand for gas is increasing, the immediate development of such appliances becomes an obligation."

Mr. Munroe proposed that a fund be provided to finance an organization to carry on research along these lines over a period of five years. He stated that there are companies now engaged in manufacturing industrial appliances who could undertake this work and carry it to a successful conclusion.

Total and Partial Vapor Pressures of Aqueous Ammonia Solutions

The complete understanding of the operation of the absorption ammonia refrigerating machine necessitates a knowledge of the following:

(a) The total vapor pressures of aqueous ammonia solutions over the whole range of temperature and concentration covered in the machine.

(b) The partial vapor pressures exerted by the separate constituents in the vapor above aqua ammonia inside of the same range.

(c) The heats of solutions of various aqua ammonia vapors in aqua ammonia of various concentrations at the different temperatures.

Although the thermodynamic properties of pure ammonia itself have been very accurately determined experimentally, the corresponding properties of aqueous ammonia solutions have received relatively little attention; and very little has been done towards the determination of the total and partial vapor pressures of aqueous ammonia solutions. Such figures as have been up until now available are limited in range, and this reduces very greatly their practical importance for the purposes of the engineer.

The determination and calculation of the total and partial vapor pressures of aqueous ammonia solutions, and their application to the absorption ammonia process illustrated by a concrete example, are the subjects which are dealt with in Bulletin No. 146 of the Engineering Experiment Station of the University of Illinois, entitled "The Total and Partial Vapor Pressures of Aqueous Ammonia Solutions."

Copies of Bulletin No. 146 may be obtained without charge by addressing the Engineering Experiment Station, Urbana, Ill.

The Koppers Construction Company announces the appointment of Mr. Donald G. Munroe as district engineer in charge of its New York office, 1750 Equitable Building, 120 Broadway, New York City.

The Tampa, Fla., Gas Company is preparing to increase the condenser capacity of its plant and has awarded the contract to the U. G. I. Contracting Company for Philadelphia for the installation of one U. G. I. high duty condenser with the necessary connections, temperature control and other parts. The condenser will be of the eight pass type 6 ft. by 18 ft. by 28 ft. high. This condenser is one of the new type that the U. G. I. has lately developed and which is proving very successful in operation.

Generated on 2024-09-07 22:19 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

NEWS OF THE PLANTS

The Weirton Steel Company, Weirton, W. Va., has authorized plans for the construction of a new tube mill at its local plant and proposes to begin work on the unit at an early date. The structure will be designed for an initial output of about 10,000 tons per month and it will be determined at an early date whether it will be of lapweld or seamless pipe character. Size and details are now also being perfected. It is said that the plant will cost in excess of $2,500,000, with equipment, which will be of strictly modern type. The company is also arranging for other expansion at its local plant, to include the construction of a new dock to facilitate the shipping and handling of materials. It will be provided with complete machinery for this purpose.

The Colonial Iron Works Company, 881 East Sixty-seventh Street, Cleveland, Ohio, manufacturer of plate products, fabricated steel products, etc., has purchased a tract of about two acres of land at St. Clair Avenue and East 175th Street as a site for the erection of a new plant. The works will consist of a number of units, the first to consist of a main one-story brick and steel structure, 120x400 ft., to cost close to $200,000. It is expected to begin work in about 90 days, to be followed by the other units closely following. The new plant will be given over largely to the production of fabricated steel material for the construction of standardized buildings. A traveling crane and other material-handling machinery will be installed in addition to regular manufacturing equipment. Lionel M. Storm is president.

In connection with existing expansion programs at its different mills, the Bethlehem Steel Corporation, Bethlehem, Pa., has enlarged the scope of the projects in a number of cases and has authorized plans for the additional work, to be carried out in the near future. At the Cambria Works, it is purposed to construct an additional shop at the steel car division, estimated to cost approximately $450,000, with machinery and equipment. Three batteries of new coke ovens will also be built at this plant, to cost close to $8,000,000. The erection of the initial battery will be started at an early date, with cost placed at about $3,000,000. At the Steelton, Pa., works, the company has authorized the complete electrification of the rail mill, with installation of electric equipment to replace all steam-driven apparatus. This work is estimated to cost in excess of $500,000. A new steel foundry will also be constructed at this plant, with the installation of considerable new equipment, as well as machinery to replace present apparatus. At the Sparrows Point, Baltimore, Md., Works, foundations are under way on a new wire mill, and superstructure work will proceed at an early date. The new unit is expected to cost in excess of $1,000,000, with machinery, and has been designed to give employment to a working quota of about 500 men. Other extensions will also be made at this plant.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has definitely decided to proceed with the erection of a new seamless tube mill, originally projected a number of months ago, and plans have been authorized for the new unit. It is likely that a site will be selected at East Youngstown for the plant, this location, it is stated, being favored by James A. Campbell, president. The plant is estimated to cost approximately $2,000,000, and contracts for primary machinery are being awarded. In this connection, Wellman-Seaver-Morgan Company, Cleveland, Ohio, will furnish the sinking mills, ingot turning machines, hot saws and certain miscellaneous equipment, while two German companies have secured awards for the piercing mill and auxiliary equipment, pilger mills, 6 to 13 in. diameter, with accessory apparatus. Other contracts for necessary machinery will be let in the near future, including transmission and power apparatus, etc. With the new mill located at East Youngstown, as now anticipated, it is said that the company will consider the construction of a smaller mill of similar type at its plant at Indiana Harbor, Ind. At this latter plant, the company has approved plans for the construction of a new group of tin mills, varying in number from 16 to 24, and it is expected to proceed with this work at an early date; this installation will mark the company's entrance into the field of tinplate production. Tentative plans are still under advisement for the installation of additional sheet mills at the Indiana Harbor plant.

The Colorado Fuel & Iron Company, Pueblo, Colo., has plans under advisement for extensions and improvements in its local steel works, estimated to cost in excess of $5,000,000, including machinery. The plans, as now projected, provide for the erection of a new plate mill, rolling mill and other mill structures, and the complete electrification of a portion of the works, with new equipment to replace present steam-driven apparatus.

The American Manganese Steel Company, Los Angeles, Cal., has completed the erection of its new local plant at Downey Road and Slauson Avenue, which has been in course of building for a number of months past. The works are said to represent an investment in excess of $500,000, and will be developed to capacity at an early date. Production will be given over largely to the manufacture of manganese steel castings for use in different branches of the oil industry. Wesley G. Nichols is president of the company.

The Elyria Iron & Steel Company, 232 East 131st Street, Cleveland, Ohio, manufacturer of rolled steel tubing and kindred products, has completed plans and taken bids for the erection of a group of five new buildings at its plant. Plans were prepared by E. McGeorge, 3030 Euclid Avenue, Cleveland, architect, who will supervise erection. Hugh B. Wick is president.

Generated on 2024-09-07 22:13 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

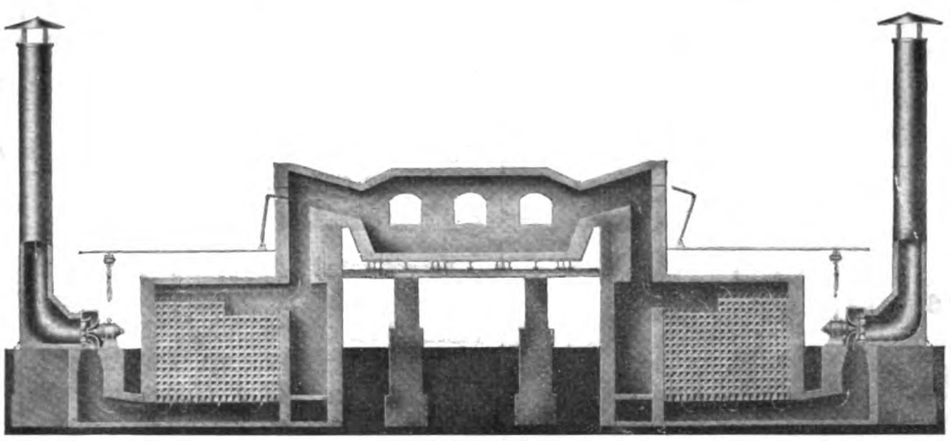
The Blast Furnace and Steel Plant

Member of the Audit Bureau of Circulations

PITTSBURGH, PA., JUNE, 1925

Entered as second class mail matter at Pittsburgh, Pa., under the act of Congress, March 3, 1879.

MORGAN
WORCESTER
ENGINEERS AND MANUFACTURERS



PATENTED

The Isley Reversing & Controlling System
for all Types of Regenerative Furnace.

Continuous Service with
Increased Furnace Production
and Decreased Fuel Consumption.
Simple Construction with Unusual Advantages.

COMPLETE INFORMATION UPON REQUEST

MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS, U.S.A.

Generated on 2024-09-07 22:19 GMT / https://hdl.handle.net/2027/mdp.39015080085239
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

Original from UNIVERSITY OF MICHIGAN